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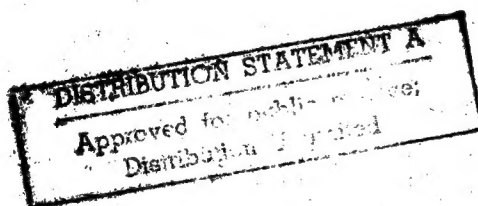
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USSR Report

MILITARY AFFAIRS

MILITARY HISTORY JOURNAL

No. 10, October 1984



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12 February 1985

USSR REPORT
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No 10, October 1984

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal VOYENNO-ISTORICHESKIY ZHURNAL.

CONTENTS

Improving the Moral-Political and Psychological Training of the Personnel (pp 3-9) (V. Khrobostov) (not translated)	
ON THE 40TH ANNIVERSARY OF THE GREAT VICTORY	
Petsamo-Kirkenes Operation in World War II Examined (pp 10-16) (A. Khrenov)	1
Employment of Artillery in Petsamo-Kirkenes Operation Traced (pp 17-21) (G. Peredel'skiy)	8
SOVIET MILITARY ART IN THE GREAT PATRIOTIC WAR	
Role, Conduct of Meeting Engagements in World War II Analyzed (pp 22-32) (A. Sokolov)	14
ON THE 100TH BIRTHDAY OF M. V. FRUNZE	
The Revolutionary, Party and State Activities of M. V. Frunze (pp 33-41) (S. Gusarevich) (not translated)	
IN THE ARMIES OF THE SOCIALIST COUNTRIES	
The Czechoslovak People's Army--A Strong Link in the Warsaw Pact (pp 42-52) (V. Kuchera) (not translated)	
The 40th Anniversary of the Army of the Socialist Republic of Romania (pp 53-58) (D. Diyeu) (not translated)	

MEMOIRS AND ESSAYS

In the Battles at Borodino (pp 59-61)
(D. Khatchenkov) (not translated)

How Spandau Fortress Surrendered (pp 61-65)
(V. Gall) (not translated)

IN FOREIGN ARMIES

Soviet View Given on U.S. Militarization of Space (pp 66-74)
(V. Shatalov, L. Shishov) 27

SCIENTIFIC PAPERS AND INFORMATION

The Defense of the Red Army Troops on the Eastern Front in the
Spring of 1919 (pp 75-81)
(A. Ageyev) (not translated)

World War II: Ammunition Supply in Arctic Conditions Traced (pp 81-82)
(I. Volkotrbenko) 36

MILITARY HISTORY DATES

Biographic Data on Army Gen A. T. Stuchenko Given (pp 83-86)
(I. Tret'yak) 38

Biographic Data on Mar Avn S. I. Rudenko Given (pp 86-88)
(Ye. Savitskiy) 42

Biographic Data on Mar Avn V. A. Sudets Given (pp 88-90)
(I. Podgornyy) 45

HISTORIOGRAPHY AND SOURCE STUDIES

The Kulikovo Battle in Recent Research (pp 91-95)
(M. Popov) (not translated)

PETSAMO-KIRKENES OPERATION IN WORLD WAR II EXAMINED

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 10-16

[Article by Hero of the Soviet Union, Col Gen (Ret) A. Khrenov: "The Petsamo-Kirkenes Operation"; Arkadiy Fedorovich Khrenov during the described period held the post of chief of the engineer troops of the Karelian Front]

[Text] As a result of defeating the Nazi troops on the Karelian Isthmus and in Southern Karelia and the withdrawal of Finland from the war, by the autumn of 1944 a favorable situation had developed for liberating the Soviet arctic. This the Nazis had endeavored to hold in order to utilize the rich mineral wealth in the area of Petsamo (Pechenga), to block the approaches to Norway and to hold on to convenient naval and air bases. For this, in the area of the Lapland Rampart in the impassable mountain-wooded terrain with numerous rocky hills, rivers, streams, lakes and swamps over 3 years a strong defense had been established consisting of three zones up to 150 km deep. "In front of us," recalled MSU K. A. Meretskov, "on a front 90 km long stretched dragon's teeth and antitank traps, dense minefields and wire obstacles. They covered all the mountain passes, ravines and roads and the heights prevailing over the terrain were true mountain fortresses. Moreover, along the coast they were covered by the shore and antiaircraft artillery in field double caponiers."¹

The Karelian Front (commander, Army Gen K. A. Meretskov) with the forces of the 14th All-Arms Army and the 7th Air Army in collaboration with the Northern Fleet (commander, Adm A. G. Golovko) was to surround and destroy the main forces of the enemy XIX Mountain Rifle Corps by their deep outflanking to the south with a simultaneous attack from the north, to capture the city of Petsamo and develop the offensive toward the Soviet-Norwegian frontier.

The Nazi Command assumed that the Soviet troops would attack on the only possible, from their viewpoint, sector: along the road leading to Petsamo. For this reason here the Nazis established the strongest defensive lines. But the troops of the front acted differently.

According to the plan worked out by the Karelian Front Military Council and approved by Hq SHC [Headquarters Supreme High Command] on 29 September, the main thrust was to be made by the left flank of the 14th Army (commander, Lt Gen V. I. Shcherbakov), where the Lapland Rampart joined the impassable

The Northern Fleet was given the mission of sealing off the Barents Sea coast held by the enemy and isolating the Petsamo enemy grouping from the northern sea lines of communications. Moreover, the fleet was to assist the 14th Army in breaking the enemy defenses and capturing Petsamo and Kirkenes.

The front's aviation was ordered to provide an air cover for the concentration of the formations and units of the 14th Army on the sector of the main thrust, to attack the enemy troops retreating from the Kandalaksha, Kestenga and Ukhta sectors and conduct reconnaissance of the enemy lines of communications for the purpose of detecting the approach of fresh forces.

By the start of the operation the 14th Army had been reinforced at the expense of other sectors and reserves of the front with four corps headquarters (XXXI, XCIX and CXXXI Rifle Corps and CXXVII Light Rifle Corps), with six rifle divisions (65th, 114th, 83d, 45th, 367th and 368th), by three rifle brigades (3d, 69th and 70th) as well as artillery, tank and engineer units and subunits. This made it possible to attain an overall superiority over the enemy as follows: by 1.8-fold for infantry, 2.8-fold for artillery, 2.5-fold for tanks, and 6.3-fold for aviation; in the sector of the main thrust the superiority in forces was: almost 4-fold for infantry, 4.5-fold for artillery and 2.5-fold for tanks.³

In preparing for the operation, particular attention was given to organizing all-round support for the troop offensive under the conditions of the Far North and to coordinating the actions of the 14th Army formations with the navy and aviation forces. I recall the commander of the front himself and his deputy repeatedly traveled to the troops for resolving these questions, for verifying the course of carrying out the planned measures and for determining the methods to break through the defenses on each planned sector with the least losses. Thus, after a careful study of the enemy antitank defenses which along the entire length of the front had been built considering the combating of light and medium tanks, Kirill Afanas'yevich [Meretskov] decided to employ the KV heavy tanks in the offensive. This was a first under the conditions of the Far North and, as the course of combat was to show, completely successful.

For the non-stop crossing of water barriers, particularly in moving along the coast which was cut by numerous rivers and fjords, the 14th Army received two battalions of amphibious motor vehicles. The commander of the front ordered these battalions to be assigned to those formations and units which in the course of the offensive were to cross the largest number of water obstacles.

The specific conditions of the Arctic terrain necessitated the establishing of specially trained engineer reconnaissance-sabotage detachments and groups for operating in the tactical and operational depth of the enemy defenses. Thus, by the start of the offensive three detachments of combat engineers were operating in the enemy rear. Moreover, in the course of the offensive two reconnaissance combat engineer groups under Capt N. P. Dormilov and Jam A. K. Doronin were sent there. From these detachments and groups important reports were received on changes occurring in the enemy defenses. In addition to observation, the combat engineers monitored the roads, they blew up bridges, destroyed telephone communications and disrupted the work of the enemy rear. They also guided our ground attack and bomber aviation to the enemy troop accumulations.

At 0800 hours on 7 October, the artillery softening up commenced and this lasted 2 hours and 35 minutes. By the time it ended it was impossible to see anything in the enemy positions. The entire area visible to the eye was covered by dense black smoke. To cap it off, a wet snow was falling. This was the first setback caused by the Arctic climate. The scrambling of aviation for bomb raids on the enemy defenses had to be temporarily be put off.

While the artillery softening up was underway, in the shelters and trenches a fresh issue of the army newspaper appeared with an appeal from the front's military council. It said: "The motherland demands that all the Russian land in the Arctic be purged of the fascist plague.... Go forward boldly, soldier of the North! All the forces of our motherland are with you...forward! The motherland expects from you victory and blesses you for the feat."⁴

The offensive drive of the Soviet troops was exceptionally high. Regardless of the fact that the tanks and artillery fell behind due to the roadless conditions, the infantry without their support moved forward successfully. The men of the 14th Guards Division (commander, Maj Gen V. V. Skryganov) by 1500 hours had broken through the main enemy defensive zone, they were the first to reach the Titovka River, they crossed it wading up to their chests in icy water and supported the crossing of the other corps formations.

During the three days of battle, the troops of the 14th Army broke through the tactical zone of the enemy defenses up to 20 km along the front, advancing up to 16 km in depth and by an outflanking maneuver of the CXXVI Light Rifle Corps had forced the enemy to begin retreating to Petsamo and Luostari.

By the evening of 9 October, Army Gen K. A. Meretskov had adjusted the combat missions for the troops and issued instructions to the commander of the 14th Army to commit the operations group of Gen B. A. Pigarevich to the engagement.

On 10 October, after a brief but strong intense shelling in a snowfall, the troops went over to the offensive. During this same night ships of the Northern Fleet landed a force consisting of the 63d Naval Infantry Brigade in the area of Malaya Volokovaya Bay. In the morning its troops linked up with units of the 12th Naval Infantry Brigade and initiated a joint offensive against Petsamo. For accelerating its liberation, in the morning of 12 October, an amphibious force consisting of 660 men was landed in the port of Linakhamari. In fierce battles which frequently developed into hand-to-hand clashes, the landing troops liberated Linakhamari and forced the enemy to retreat. During this time the men of the CXXVI Light Rifle Corps, having made a deep envelopment of the right flank of the Nazi defensive positions from the southwest, approached the broad and rapidly flowing Petsamo-Yoki River, they forded it and together with the remaining troops continued the offensive deep into the enemy defenses.

In stubborn battles, the formations of the 14th Army in cooperation with the forces of the Northern Fleet on 15 October liberated Petsamo, having advanced 60-65 km and having established favorable conditions for developing the offensive toward the Norwegian frontiers.

On 15 October, Army Gen K. A. Meretskov took a decision to continue the offensive. After a certain regrouping, the troops of the front on 18 October resumed combat operations and in 5 days cleared the enemy out of the area to the northwest of Petsamo and to the west as far as the frontier with Norway, they eliminated the enemy shore defenses and captured the settlement of Nikel, having advanced 25-35 km.

With the reaching of the Norwegian frontier by the troops, the commander of the front requested and received from the Supreme High Command permission to cross the frontier. There followed one other rush along diverging axes: to the northwest toward Kirkenes, to the west toward the town of Neyden and to the southwest to the town of Nautsi. This rush across the rocks and swamps bypassing destroyed, blocked roads, through minefields, across rapid, icy rivers and deep, steep-sided fjords was so rapid that by 25 October Kirkenes had fallen and 2 days later, Neyden and Nautsi.

The Norwegian people ecstatically greeted the Soviet liberators. On 30 June 1945, the Norwegian King Haakon VII said: "The Norwegian people have followed with enthusiasm the heroism, bravery and powerful thrusts which the Red Army has made against the Germans.... The war was won by the Red Army on the Eastern Front. Precisely this victory led to the liberation of Norwegian territory in the north by the Red Army.... The Norwegian people have welcomed the Red Army as a liberator."⁵

On 29 October, the Petsamo-Kirkenes Operation was over. In the course of it the XIX Mountain-Rifle Corps had lost about 30,000 out of the 53,000 soldiers and officers in killed alone. The Northern Fleet had sunk 256 ships and vessels. Our losses were 15,773 men killed and wounded including 2,122 men on Norwegian territory.⁶

In October 1944, Moscow thrice saluted the troops of the Karelian Front and the forces of the Northern Fleet: in the liberation of Petsamo, in the crossing of the state frontier and in the liberating of Kirkenes. For decorating those who had participated in the battles in the Far North, the Soviet government had struck the medal "For the Defense of the Soviet Arctic." For military valor and heroism some 51 units and formations received the honorific designators of Pechenga and Kirkenes while 70 units and formations received combat orders.⁷

The military accomplishments of the front's commander, Gen Kirill Afanas'yevich Meretskov, were highly regarded. On 27 October he was awarded the title of Marshal of the Soviet Union.

The Petsamo-Kirkenes Operation of the Karelian Front and the Northern Fleet is the sole operation conducted in the Arctic area by the joint efforts of all branches of troops and Armed Services in the course of the war. Although in terms of the number of men and weapons involved in it, the width of the zone, the pace and depth of advance it was less than the other strategic offensive operations of the Soviet Army in 1944, strategic goals were achieved in the course of it. The Soviet troops liberated the occupied areas of the Soviet Arctic and provided great aid to the Norwegian people in their liberation from the Nazi occupiers. The victory of our troops in the Far North together with

the successes achieved on the other sectors of the front played a major role in establishing conditions for conducting the offensive operations on the Berlin sector.

The combat in the Arctic was also very instructive from the viewpoint of the development of military art and primarily the art of organizing close operational-tactical coordination of the ground forces and aviation with the forces of the Northern Fleet and in conducting flexible and bold maneuvering under difficult terrain conditions employing specially trained and organizationally adapted light rifle corps. Also widely employed was the maneuvering of the subunits in the aim of outflanking enemy strongpoints combined with an attack from the front.

The Northern Fleet operations played a major role in achieving the goals of the operation. The landing of amphibious forces contributed to the successful advance of the formations on the right flank of the 14th Army, to eliminating the enemy shore defenses and to the capturing of its naval bases. The active operations of the ships and naval aviation on the lines of communications deprived the enemy of any possibility of helping its land grouping and thwarted the evacuation of the enemy troops.

The experience of the operation showed that in the Far North aircraft are one of the most important means for supporting the infantry. It made it possible to conclude that it was feasible to employ all branches of aviation in large air formations.

For the first time in the Far North heavy tanks and self-propelled artillery mounts were employed. Their operations were unexpected for the enemy and greatly aided the advancing infantry in eliminating the strongpoints, in capturing a number of towns and breaking enemy resistance on intermediate lines.

The productivity of engineer work in the Arctic with regulation equipment was 2-2.5-fold lower in comparison with ordinary conditions. A special need arose for engineer road units equipped with special devices for road work with a deep snow cover and rocky ground.

As a whole, the experience of the Petsamo-Kirkenes Operation showed that, regardless of the difficult physiogeographic and severe climatic conditions, in the Far North with careful organization and preparation it was possible to carry out major offensive operations to a great depth.

At present, in the aggressive plans of the American Command, great attention is being given to the Arctic regions as the left flank of NATO. This requires a thorough study of the invaluable experience of organizing and conducting troop and naval operations under the conditions of the Far North during the years of the Great Patriotic War.

FOOTNOTES

- ¹ K. A. Meretskoy, "Na sluzhbe narodu" [In the Service of the People], Moscow, Voenizdat, 3d Edition, 1983, pp 370-371.

- ² A light rifle corps had two or three rifle brigades (three battalions in each), one mortar battalion and one artillery battalion with 76-mm mountain guns.
- ³ "Operatsii Sovetskikh Vooruzhennykh Sil v Velikoy Otechestvennoy voyne 1941-1945" [Operations of the Soviet Armed Forces in the Great Patriotic War of 1941-1945], Moscow, Voenizdat, Vol 3, 1958, pp 633, 639-660; "Sovetskaya Voenennaya Entsiklopediya" [Soviet Military Encyclopedia], Moscow, Voenizdat, Vol 6, 1978, p 322.
- ⁴ CHASOVOY SEVERA, 7 October 1944.
- ⁵ "Istoriya vtoroy mirovoy voyny 1939-1945" [History of World War II of 1939-1945], Moscow, Voenizdat, Vol 9, 1978, p 153.
- ⁶ Ibid., p 152.
- ⁷ "Sovetskaya Voenennaya Entsiklopediya," Vol 6, p 322.

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EMPLOYMENT OF ARTILLERY IN PETSAMO-KIRKENES OPERATION TRACED

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 17-21

[Article by Mar Art G. Peredel'skiy: "Combat Employment of Artillery in the Petsamo-Kirkenes Operation"; during the period of the Petsamo-Kirkenes Operation G. Ye. Peredel'skiy was in command of the 928th Artillery Regiment]

[Text] In the course of the Petsamo-Kirkenes Operation, artillery played an important role in defeating the enemy grouping and in liberating the Soviet Arctic from the Nazi invaders. Under the difficult natural and climatic conditions of the Far North, its fire was often the only means of neutralizing and destroying the enemy defensive installations as well as preventing the maneuvering of its reserves.

By the start of the operation some 2,100 guns and mortars had been concentrated in the zone of the 14th Army of the Karelian Front as a result of the regrouping of the artillery units and formations from the 7th and 32d Armies and the front's reserve. The largest amount of artillery was on the left flank of the 14th Army where the main thrust was to be made. As a total on the army breakthrough area there were around 1,400 guns and mortars. This made it possible to establish in the breakthrough areas of the 10th Guards and 65th Rifle Divisions which were to make the main thrust artillery densities equal, respectively, to 156 and 168 guns and mortars per kilometer of front. In the 14th and 114th Rifle Divisions fighting on the flanks of the breakthrough the artillery density was 2-2.5-fold less. Due to the fact that the troops of the front were to conduct offensive operations in an area where granite rocks and mountains with steep slopes and precipitous bluffs, gorges and deeps alternated with swampy areas, the Soviet Command assigned an important role to mortars. Suffice it to say that in the sector of the main thrust of the army, these were more than 60 percent of the artillery existing here.

The army artillery grouping consisted of long-range groups (DD), guards mortar units [rocket launchers] (GMCh) and an antiaircraft artillery group (ZAG). The DD group which consisted of a cannon regiment and a separate battalion was given the mission of neutralizing the artillery, control posts and reserves. The GMCh group was divided into two subgroups. Each of these consisted of one guards mortar brigade. The subgroups were assigned to neutralize enemy personnel and weapons in the two strongest enemy strongpoints on Mounts Bol. and Mal. Kirikvayvish.

The artillery grouping of the first echelon rifle corps was made up of DD groups (each with two artillery regiments) and GMCh groups (one BM-13 regiment). The corps DD groups had the mission of combating enemy artillery in the breakthrough sector.

In the rifle divisions which were to fight in the first echelon, two or three infantry support groups were established consisting of two-seven battalions in each. One of these was given the mission of countermortar bombardment.

For destroying the enemy weapons on the forward edge and for making passageways through the wire obstacles, some 172 guns of 45-152-mm caliber were used for firing by direct laying. Their density was 11-12 guns per kilometer.¹

Command and control of these guns as well as the mortars of the rifle regiments was provided by the artillery chief of the rifle regiments.

Considering the volume of fire tasks for the artillery and the necessity of monitoring the ranging and air operations, the duration of the artillery softening up for the attack was set at 155 minutes. This commenced with a 5-minute intense shelling by all the artillery (with the exception of the rocket brigades) at the enemy strongpoints, communications centers and command posts. Then for 30 minutes there was a ranging check. The following 60 minutes were for the destruction of observed targets and the cutting of passageways through the wire obstacles. Such a duration for this period was brought about by the need to destroy up to 15 targets per kilometer in individual sectors. After this the aviation for 30 minutes was to attack the enemy defenses while the artillery was to neutralize individual important targets. For the following 20 minutes, the artillery combined with salvos of the two rocket launcher brigades neutralized the newly detected, most important targets. Fire density reached maximum intensity in the following 10-minute intense shelling by all the artillery against the enemy's forward edge and near depth and its artillery batteries.

The planning of counterbattery bombardment was basically carried out according to our prewar views. For neutralizing the 21 detected enemy batteries, 43 batteries were employed. The fire of one battalion was planned against each reconnoitered battery. For this reason the missions of neutralizing them were to be carried out successively by intense shelling of 3-5 minutes consuming 25-30 rounds per hectare of target. A fire reserve for the commanders of the DD groups was established by the incomplete fire intensity of one-three battalions in the group and a reserve of ammunition of 750-1,000 rounds. This made it possible to additionally neutralize up to three newly detected targets.²

The neutralizing of three of the five reconnoitered mortar batteries was entrusted to the countermortar group of the 65th Rifle Division (with 12 120-mm mortars and 36 122-mm howitzers) consuming up to 200 rounds for each reconnoitered battery. The two other mortar batteries were to be neutralized in the process of firing at the sheltered personnel in the strongpoints.

The fire of the rocket artillery was planned considering the attaining of the greatest effectiveness from the actions of the rocket projectiles against enemy personnel outside of shelters. Also considered was the need to increase the

density of fire by the end of the artillery softening up for the attack. This would facilitate the moving up of the rifle subunits to the jump-off position for the attack. Proceeding from this, the salvos of the three rocket launcher regiments were planned in the course of the entire artillery softening up for the attack while the salvo of the M-20 and M-31 brigades with a total weight of 97 tons³ was to occur closer to the end. The total density of neutralizing the strongpoints by rocket projectiles reached 82-85 rockets per hectare.⁴

The artillery support for the attack was to be carried out by the successive concentration of fire [PSO] to a depth up to 2.5 km.

For the unnoticed shifting from artillery softening up of the attack to artillery support there was to be firing against the first line using PSO with the same rate as in the last intense shelling.

After the infantry had captured the centers of resistance in the first line, the advancing troops were to be supported by concentrated fire and by fire at individual targets.

For the artillery softening up of the attack some 140,500 rounds were allocated⁵ with 60 percent of these being mortar shells. For the artillery softening up of the attack and for supporting the advancing troops in depth 0.6-1 unit of fire was allocated.

The selection, ranging and engineer equipping of the firing positions was to be done simultaneously with the conduct of battles to improve the initial position. The reconnaissance battalion and the topographic detachment set 50 control points which provided the topographic base for the artillery grouping. The arriving artillery reinforcements were kept in the assembly areas until the equipping of the firing positions had been completed.

The equipping of the firing positions, their camouflaging and the moving up of the artillery to them under conditions where the enemy could view the positions of our troops to a depth of 20 km was carried out only at night. On 24 September 1944, the concentrating of the basic mass of artillery had been completed. Individual, additionally assigned reinforcements took up their firing positions during the period from 28 September through 7 October inclusively. Their commanders for selecting and fixing the firing positions sent out reconnaissance groups on vehicles which were able to complete the basic work before the approach of the columns.

The artillery softening up for the attack commenced on 7 October 1944 at 0800 hours and was carried out in accord with the plan. The deterioration of the weather at the end of the destruction period did not allow the 7th Air Army to carry out the planned air softening up for the attack and this was not envisaged by the artillery softening up plan. For this reason, the planned artillery fire density for 30 minutes was not sufficient for effectively destroying the enemy defenses. It would have been advisable in the organizing of the artillery softening up for the attack to have an alternative where aviation would be unable to carry out its missions or for that time to provide increased consumption of ammunition.

Support for the infantry attack was provided by the PSO method while the 82-mm and 120-mm mortars during this time provided a so-called "small rolling barrage" against the three lines which were 150 m apart. On the one hand, this was explained by the fact that in firing at lines of a rolling barrage from weapons having a flat trajectory accurate firing was not provided on the back slopes of elevations since the angle of descent of the shells ($6-10^\circ$) often equaled the slope angle of these hills or was less than it and, on the other, by the fact that the focal nature of the enemy defenses with clearly expressed strongpoints made it possible during the period of attack to concentrate heavy fire against areas which coincided with the most important targets. In this instance accurate fire was provided by preliminary registration and the assigning of areas considering the tactical and technical properties of the weapons. Finally, such an organization of support for the attack was due to the prevailing number of mortars over guns and their increased supply of ammunition.⁶

The artillery support for the actions of the infantry and close support tanks in combat deep in the enemy defenses and in pursuing the enemy under roadless conditions was basically carried out by the firing of support guns, mortars, SAU [self-propelled artillery mount] as well as the long-range cannon artillery. The rocket artillery in the course of pursuing the Nazis was used only on those sectors where the condition of the roads made possible the movement of motor transport.

In the course of the offensive against Petsamo, the 7th Guards Tank Brigade was committed to battle in the zone of the 114th Rifle Division of the XCIX Rifle Corps. The artillery support for its commitment and fighting deep in the defenses was as follows. Prior to the attack by its forward detachment a brief artillery softening up was carried out while the attack which was carried out along the road from the area of Luostari in the direction of Petsamo was supported by the PSO method against four lines to a depth of 2 km. The further advance by the tank troops was supported by the concentrating of fire against 26 sections as called in by spotters which were in radio-equipped combat vehicles.

During the first day of the operation, firing positions were changed only by individual mortar batteries and one artillery regiment which was part of the PP group of the right-flank division. The remaining artillery units were unable to change their firing positions since the roads for their advance, having been destroyed by the enemy in its retreat, had not been repaired. Even on 8 October, the support for the troops which had crossed the Titovka River was provided by the artillery from old positions. Under these conditions, the artillery was forced to fire at ranges close to maximum.

By 11 October, it had been possible to repair the road and the crossings over the Titovka River and ferry across 11 artillery and mortar regiments. But it was a difficult matter to deploy them at firing positions, since there were no approaches to the designated position areas and their equipping required a great deal of time and effort. The artillery had to be deployed directly by the road and as a consequence of this its firing positions were extended 8 km in depth.

With the development of the offensive, the artillery of the main forces of the rifle corps usually followed along roads which had already been rebuilt by combat engineers. The artillery deployed into battle formation only in instances when the enemy put up significant resistance. Thus the CXXXI Rifle Corps was forced by the end of 16 October to halt the offensive, to bring up the artillery from the eastern bank of the Petsamoyoki River to the area of Lake Nyasyunkayarvi, to neutralize the enemy strongpoints and resume the offensive on 18 October.

A particular feature in the changing of firing positions was that the number of traction units per gun had to be doubled or even tripled. For this reason more often the regiments changed firing positions by divisions in two or three stages. Because of this a limited number of support weapons moved with the forward units which were pursuing the enemy. The number of guns in the rifle units and subunits was reduced by 2-3-fold and the traction units released were used for removing the remaining artillery.

In pursuit of the enemy, one artillery battalion from each corps regiment followed along with each light rifle regiment which carried out an outflanking maneuver. The rifle brigades from these corps each had just one TOF battery (four cannons). Such an amount of artillery did not impede the maneuvering of the formations and provided them with the necessary strike force in actions on the exposed enemy flank.

In the course of the battles to liberate the Arctic, the Soviet artillery troops showed mass heroism. Here is one characteristic example. The commander of the 3d Battalion from the 29th Guards Rifle Regiment, Maj Zimakov, in the liberation of Luostari, was encircled along with troops of the headquarters platoon. Calling in battalion fire on himself, the officer boldly led the artillery troops into an attack. The enemy ring was broken and the artillery troops reached their own forces.

The experience of combat in the Arctic has shown that the artillery grouping for actions under the conditions of mountain tundra should differ from one which is established in temperate latitudes. The initially established strong infantry support groups from the battalions of different regiments were cumbersome and hard to control. They had to be broken up, leaving in the group two or three battalions which had better cross-country capability. It was also necessary to increase the amount of artillery with a caliber of 122 mm and higher, since only it could destroy the pillboxes in the strongpoints set up in rocky ground. The pack-mountain artillery and mortars proved effective.

The rocket artillery was widely employed only during the period of the artillery softening up for the attack. In the course of pursuing the enemy this was employed on a decentralized basis and only in those sectors where the condition of the roads provided for the movement of motor transport. The M-20 and M-31 brigades, after breaking through the main defensive zone, were put into the reserve of the army commander.

We should also note the experience of transporting ammunition by air. Under conditions when the enemy lost a significant amount of its heavy weapons, supplying the advancing troops even with the minimum necessary ammunition

frequently was crucial for the outcome of combat. Of particularly important significance was the delivery of ammunition for the outflanking formations.

With the limited number of roads and their destruction by the enemy, the divisional, corps and army artillery fell behind the advancing troops, it was forced to fire at ranges close to maximum and deployed along the roads. This required the broad use of spotter aviation.

The difficult nature of the terrain required a significantly greater reinforcing of the artillery with combat engineer units and subunits than in temperate latitudes. Only with their aid was it possible to promptly set up the firing positions and the access routes to them, to repair the roads and throw up crossings over the numerous rivers and lakes.

Practice showed that under the conditions of a limited amount of terrain areas suitable for deploying the artillery and with poor topographic support, the selection and fixing of the firing positions is better done on a centralized basis. This significantly facilitated the work of the artillery units in equipping the positions and aided largely in achieving surprise for the start of the operation.

FOOTNOTES

¹ TsAMO SSSR [Central Archives of the USSR Ministry of Defense], folio 363, inv. 6208, file 261, sheet 30.

² Ibid., sheet 32.

³ "Polevaya reaktivnaya artilleriya v Velikoy Otechestvennoy voyne" [Field Rocket Artillery in the Great Patriotic War], Moscow, Voenizdat, 1955, p 396.

⁴ Ibid., p 467.

⁵ TsAMO, folio 363, inv. 6208, file 261, sheet 27.

⁶ "Sovetskaya artilleriya v Velikoy Otechestvennoy voyne 1941-1945 gg." [Soviet Artillery in the Great Patriotic War of 1941-1945], Moscow, Voenizdat, 1960, p 580.

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10272

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ROLE, CONDUCT OF MEETING ENGAGEMENTS IN WORLD WAR II ANALYZED

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 22-32

[Article by Candidate of Military Sciences, Docent, Lt Gen A. Sokolov: "The Development of the Art of Organizing and Conducting Meeting Engagements in the Great Patriotic War"]

[Text] In previous wars there were meeting engagements as a type of offensive actions in the course of which both sides endeavored to carry out the given missions by an offensive. As weapons have developed, these engagements have become an evermore frequent phenomenon in military operations while the situational conditions under which they arose have become more diverse. During the years of World War I, for example, meeting engagements developed, as a rule, from a march and occurred chiefly in the maneuvering period of the war.

During the Great Patriotic War meeting engagements arose both on the offensive and defensive. In the offensive operations these were carried out, as a rule, in the encountering of the advancing troops with enemy reserves and on the defensive in making counterstrikes against enemy groupings which had broken through. Here both on the offensive and defensive meeting engagements arose at varying depth and in the most diverse situation.

In offensive operations, when the enemy employed its closest operational reserves for checking the commenced offensive by our troops even in the course of the breakthrough or immediately after it, meeting engagements occurred at the outset of an operation. Thus, in completing the breakthrough of the tactical defensive zone the Nazis made a counterstrike against the 4th Tank Army which had been committed to battle from the First Ukrainian Front using the forces of the XXIV Tank Corps which was in the reserve of Army Group A. In the course of the ensuing meeting engagement, the Nazi troops endeavored to cut off the formations of the 4th Tank Army from the 13th Army, to crush them and prevent their further advance. By decisive actions by the advancing formations the enemy counterstrike grouping was surrounded and destroyed.

In the development of an operation, meeting engagements usually occurred in encountering the operational reserves being moved up from deep in the enemy defenses. By counterstrikes on the move they endeavored to hit the assault groupings of our troops and stop their advance. Thus commenced the meeting

engagement of the 1st Tank Army and units of the 6th Guards Army in the Belgorod-Kharkov Operation against three enemy tank divisions in the area of Bogodukhov in August 1943. The Nazis endeavored to cut off and defeat the 1st Tank Army and capture the Kharkov--Poltava Railroad. At a price of great losses the enemy tank divisions succeeded in pressing the formations of the 1st Tank Army and 6th Guards Army which had been weakened in previous battles. But by the moving up of the 5th Guards Tank Army and artillery units to this sector, the enemy counterstrike was checked (see Diagram 1).

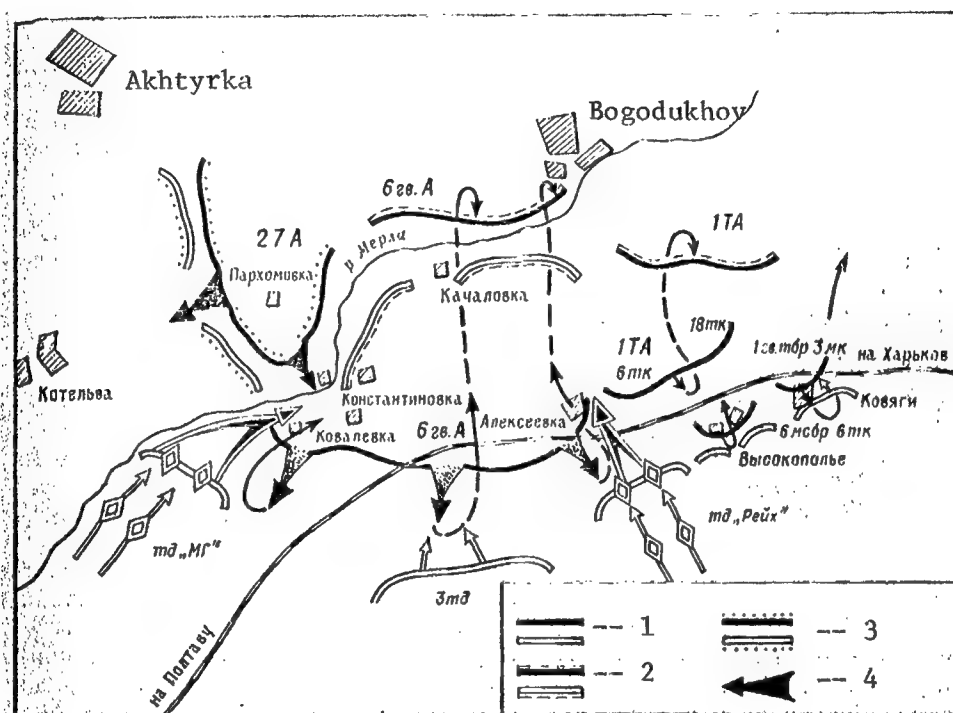


Diagram 1. Meeting Engagement in Bogodukhov Area

Key: 1--Position of sides on 14 August
 2--By end of 15 August
 3--On 16-17 August
 4--Attacks by 27th Army on 15-17 August

Sometimes meeting engagements arose in eliminating the attempts by the German troops to break out of an encirclement. A characteristic example would be the meeting engagement of the 5th Guards Tank Army and the 48th Army in the East Prussian Operation against a troop grouping comprised of four infantry divisions, two motorized divisions and one tank division endeavoring by a strong counterstrike to restore the lines of communications with Central Germany and establish contact with the main Wehrmacht forces. In the course of stubborn 3-day battles the enemy grouping was crushed and its attempts to break out of the encirclement were thwarted.

Meeting engagements frequently occurred in the concluding stage of offensive operations, when the advancing troops which had been weakened or suffered

significant losses in the course of previous extended combat were forced to repel strong counterstrikes by deep operational enemy reserves.

In the defensive operations of the initial period of the war, meeting engagements by the mechanized corps which made up the second echelons of the armies and fronts developed during the first days of hostilities against the assault groupings of the Nazi troops advancing on the main strategic sectors. The XII Mechanized Corps and a portion of the III Mechanized Corps of the Northwestern Front, the XI Mechanized Corps of the Western Front and the XV and VIII Mechanized Corps of the Southwestern Front were moved up to meet the Nazi troops which had broken through. Regardless of the fact that combat was conducted under extraordinarily difficult conditions against superior enemy forces, our troops which were forced to enter the engagement from the march tied down the enemy groupings, caused them damage and provided time for organizing the defenses on new lines.

In a number of instances our counterstrike groupings under the cover of the troops on the defensive in front took up the initial position and attacked in the flank and rear of the advancing enemy troops. Thus, the troops of the 11th Army of the Northwestern Front in the region of Soltsy on 14 July 1941 made a counterstrike against the advancing enemy 8th Tank and 3d Mechanized Divisions. In a meeting engagement which lasted 4 days, the Soviet troops caused significant damage to the enemy, they halted its advance and then threw the enemy back more than 40 km.

Meeting engagements also arose in the concluding stage of defensive operations. In the course of a counterstrike by the 5th Guards Tank Army and a portion of the forces of the 5th Guards Army against the enemy tank divisions Reich, Todten Kopf, Adolf Hitler and the basic forces of the III Tank Corps at Prokhorovka and which assumed the character of a meeting engagement, significant damage was done to the Nazi troop grouping. As a result, the enemy, in being forced to abandon any further advance, went over to the defensive.

As research has shown, under the influence of the developing weaponry and the altered nature of combat, meeting engagements underwent substantial qualitative changes with an increase in their scope, a significantly more complex struggle to seize the initiative and a shorter length of the engagements. They assumed a more dynamic nature than before and occurred under the conditions of rapid and abrupt changes in the situation.

In a majority of instances the meeting engagements developed on a front from 20 to 40 km and sometimes wider. They were conducted by forces of one or two armies with the support of a large amount of aviation. The depth of advance varied from 10 to 60 km. The duration of many engagements was 2.5-5 days. Here the rate of advance of the troops in individual engagements reached 15-20 km a day (Table 1).

Meeting engagements were usually conducted in the area of one or more rarely two armies. However, the commander of a front, in possessing aviation, second echelons and reserves, particularly tank and mechanized formations as well as artillery weapons, had a direct impact on their course and outcome, directing the efforts of the troops to defeat the enemy in accord with the overall

Table 1

Scope of Certain Meeting Engagements During Years of Great Patriotic War*

Name of front, area and time of meeting engagement	Width of engagement front, km	Depth (planned), km	Length of engagement, days	Rate of advance, km/day	Result of engagement
Northwestern Front, Shyaulyay, 23-25 Jun 1941	35-40	45-50	3	1.5-2.5	Enemy checked for 3 days
Southwestern Front, Lutsk, Dubno, Brody, 23-29 Jun 1941	25	50	4	10-12	Enemy held up for week
Voronezh Front, Bogodukhov, 11-14 Aug 1943	40	30	3	6-10	Portion of Voronezh Front forces temporarily went over to defensive
Voronezh Front, Prokhorovka, 12-16 Jul 1943	8-10		5		Enemy abandoned offensive plans in Kursk Battle
First Ukrainian Front, Kielce, 13-15 Jan 1945	to 20	40	2.5	20	Enemy crushed, basic portion of its forces surrounded and destroyed
Second Belorussian Front, Wormditt, 30-31 Jan 1945	50	14	2	6-8	Enemy went over to defensive, its attempts to break out of encirclement checked

* See: "Sovetskaya Voyennaya Entsiklopediya" [Soviet Military Encyclopedia], Vol 1, 1976; Vol 6, 1978; "Istoriya vtoroy mirovoy voyny 1939-1945" [History of World War II of 1939-1945], Vol 4, 1975; Vol 7, 1976; "Velikaya Otechestvennaya vojna Sovetskogo Soyuza 1941-1945. Kratkaya istoriya" [The Great Patriotic War of the Soviet Union of 1941-1945. Concise History], Moscow, Voenizdat, 1965; "Sovetskoye voyennoye iskusstvo v Velikoy Otechestvennoy voyne 1941-1945" [Soviet Military Art in the Great Patriotic War of 1941-1945], Moscow, Voenizdat, 1962; VOYENNO-ISTORICHESKIY ZHURNAL, No 4, 1973; No 9, 1977; No 2, 1978.

concept of the operation. This is explained by the fact that a meeting engagement arose, as a rule, on the main sector in the zone of operations of the main troop grouping of the front which had achieved the greatest success. The success of carrying out the mission set for the front depended upon the outcome of this engagement.

As combat experience was acquired, the skill of the commanders and staffs increased in preparing and conducting meeting engagements. Their organization was most often carried out in the course of the initiating of the engagement, as a rule, in extremely limited times. For example, the 5th Guards Tank Army had all of 9 hours to organize the meeting engagement in the area of Wormditt,¹ while the command of the Voronezh Front had around 6 hours to defeat the enemy III Tank Corps in the area of Bogodukhov.² In this short period of time it was essential to adjust or adopt a new decision, to set the tasks for the troops, to organize cooperation in relation to the new tasks, to establish the necessary grouping of men and weapons and resolve the questions of supporting combat operations.

Along with the great efficiency of the commanders and staffs, of great importance in the rapid and successful carrying out of the tasks involved in organizing the meeting engagements was anticipating the time and conditions of their occurrence. This made it possible to carry out a number of measures ahead of time, the most important ones being: determining the probable line of the encounter and the area for deploying the troops, establishing the necessary grouping of men and weapons, the prompt orienting of subordinates to the possibility of the outbreak of a meeting engagement with the enemy and ensuring a dependable cover for one's troops against air strikes. As a result of carrying out these measures, the time was significantly reduced needed to organize the meeting engagement and conditions were established for anticipating the enemy and seizing the initiative.

The commanders of armies and fronts took a decision for a meeting engagement when they possessed the initial, often incomplete data about the enemy grouping and it was impossible to determine the most probable enemy plan. For this reason reconnaissance was conducted continuously and to the entire depth of the set combat mission using all means, primarily aviation. This was the case, for example, in the Orel Operation in July 1943, when air reconnaissance promptly warned of the concentration of three enemy divisions 40 km from the front line and the moving up of their forward units to meet the advancing 11th Guards Army; in the Belorussian Operation in the meeting engagements occurring in the zones of the 5th Guards Tank Army in the area of Kholopenichi, Krupki and of the 5th Army in the area of Kaunas and so forth.

The all-arms and tank armies in a meeting engagement usually were given immediate and subsequent missions. In offensive operations, the immediate mission was to defeat the forward formations of the assault grouping and reach a line which ensured further operations to conclude its rout. The subsequent mission was to split up (encircle) the enemy grouping and destroy it, to reach a line or area which would provide good conditions for further offensive actions. Often the armies were given only one immediate mission and the axis of the further offensive. In defensive operations, the immediate mission of the grouping making the counterstrike usually consisted in bleeding the enemy white in the

given sector and halting its advance. The further mission was to complete the defeat of the opposing enemy grouping and to restore the initial position or take a line for the assuming of an advantageous operational position by the defending troops.

Combat missions for the commanders of formations and units were given by radio, via liaison officers and staff officers. The commanders of armies (fronts) often gave personally the missions to formations (field forces) fighting on the sector of the main thrust or carrying out the main mission. Under conditions of limited time these were given with the aid of map orders or diagram orders with the missions noted on them or brief combat orders often handwritten by the commander or chief of staff. The missions for the troops were frequently adjusted as was caused by the dynamicness of combat operations and the abrupt changes in the situation.

Simultaneously with the setting of the combat missions, the questions of cooperation were clarified. During the concluding period of the Great Patriotic War, when operations began to be prepared for more carefully or in playing them through with the leadership in a terrain mock-up, for example, in the Belorussian and Berlin Operations, questions of cooperation were worked out in adopting one of the variations for defeating the enemy operational reserves in a meeting engagement. Starting from the second period of the war, in all operations, including during the period of conducting meeting engagements, much attention began to be given to cooperation with aviation. The command posts of armies and formations had aviation representatives who had contact with the airfield and aviation in the air. In the forward detachments there frequently were guidance officers. All of this, undoubtedly, told on the results of the air support for the troops and the success of the meeting engagements.

In anticipation of a meeting engagement, the commanders of the armies and fronts and their staffs made a maximum effort to organize dependable troop control. With the initiating of the engagement, the army commanders, as a rule, with the operations group of the staff were located at a command-observation post which was set up in the sector of the main thrust some 2-4 km from the troops. Front commanders often commanded from a forward-shifted auxiliary command post (VPU). As a whole troop command in the meeting engagements was characterized by greater centralization.

The conduct of a meeting engagement. For achieving success in a meeting engagement an important role was assigned to the seizing and retaining of initiative. The struggle for initiative was conducted with unabating intensity usually from the start to the end of the meeting engagement. The sides endeavored to anticipate one another in the deployment of forces, in fire damage, in seizing an advantageous line and in going over to the offensive. All of this gave meeting engagements an intense, rapid and fluid nature.

A significant role in achieving success in meeting engagements was played by the vanguards and forward detachments with the latter more often being called forward units. Being strong in size (from a reinforced regiment in a division up to a reinforced brigade in the tank and mechanized corps), they possessed sufficient independence in conducting combat, keeping 10-15 km and more away from the main forces. They anticipated the enemy in seizing advantageous lines,

they were the first to take the attacks of the enemy reserves, they rapidly attacked the enemy, they caused damage, they tied down the Nazi forward units, forcing them to deploy on disadvantageous lines and they supported the committing to battle of their main forces, thereby contributing to their successful seizing of initiative. The results of the meeting engagement depended to a significant degree upon the decisiveness of their actions. Thus, the meeting engagement in the area of Bogodukhov on 11 August 1943 started by meeting encounters of the forward units from the III Mechanized Corps (1st Guards Tank Brigade) and the VI Tank Corps (6th Motorized Rifle Brigade) from the 1st Tank Army with the forward units of the SS tank divisions making the counterstrike. The meeting engagement in the area of Kielce started by battles of the forward detachments from the X Guards Tank Corps (63d Guards Tank Brigade) and the VI Guards Mechanized Corps (16th Guards Mechanized Brigade) with units of the enemy 17th and 16th Tank Divisions.³

Characteristic were the operations of the tank subunits in the forward units. They either rushed the enemy, firing on the move, or carried out an ambush. In the latter instance they let the enemy reconnaissance and security pass by and suddenly opened fire on the main forces, causing them to hurriedly deploy and attack the forward detachment, coming under attack by the main forces. Such a start predetermined the successful course of a meeting engagement. But where the success of the vanguards and the forward detachments was not promptly developed by the main forces, the troops lost initiative and the rate of advance slowed down. Such a phenomenon occurred in certain formations in meeting engagements conducted by the troops of the Voronezh Front during the period of 11-20 August 1943 to the southwest of Kharkov.⁴

The committing of the main forces to battle usually was preceded by a brief but intense shelling lasting 15-20 minutes. In the course of this chiefly the enemy personnel and artillery were neutralized. Starting with the second period of the war, in many meeting engagements long-range army artillery groups as well as rocket launcher groups participated in the fire damage to the enemy. Self-propelled artillery in many engagements carried out the tasks of fire support for the infantry and tank attack. Tank fire also played a major role. Where the artillery succeeded in anticipating the enemy in deployment and opening fire, its grouping caused tangible losses, it tied down the enemy maneuvering while our main forces entered combat under favorable conditions. The basic mass of artillery fought in the first echelon formations and this made it possible, as is seen from Table 2, to establish an average density from 12 to 30 guns and mortars per kilometer of engagement front and considering the tanks and SAU [self-propelled artillery mount], from 24 to 62 barrels (Table 2). If the artillery was late in deploying or if there was not enough of it, the engagement was drawn out and did not always achieve the set goals. This was the case in the first period of the war when artillery support for the troops participating in a meeting engagement was provided predominantly by artillery which was part of formations and units or when because of the spring mud the basic mass had fallen behind the advancing troops (particularly that on mechanical traction), as was the case during the meeting engagement at Proskurov in March 1944.

Aviation played an ever-increasing role in the successful conduct of meeting engagements. It attacked the enemy reserves in the course of their moving up

and on the deployment lines, in the period of initiating and conducting combat and provided a secure cover for its troops against air strikes. At the same time during periods of bad weather conditions as well as with a high rate of offensive operations, when aviation could not rebase and shift the command posts up behind the advancing troops, the basic burden of fire damage to the enemy rested on the artillery. In these instances the lack of air support for the forward detachments was particularly felt.

Table 2

Average Density of Artillery, Tanks and SAU
per Kilometer of Front in Meeting Engagements*

Area and Time of Engagement	Width of Front, km	No. of Guns and Mortars	No. of Tanks and SAU	Average Density/km of Front		
				Artillery	Tanks	Total
Bogodukhov 11-14 Aug 43	40	480	650	12	16	28
Fastov 7-10 Nov 43	35	488	373	14	10	24
Kielce 13-15 Jan 45	20	489	750	24	37	61
Wormditt** 30-31 Jan 45	20	324	200	16	10	26

*See: "Belgorodsko-Khar'kovskaya nastupatel'naya operatsiya Krasnoy Armii" [The Belgorod-Kharkov Offensive Operation of the Red Army], 1945; "Boyevoy opyt bronetankovykh i mekhanizirovannykh voysk v Otechestvennoy voyne" [Combat Experience of Armored and Mechanized Troops in the Patriotic War], Collection No 4; VOYENNO-ISTORICHESKIY ZHURNAL, No 4, 1973; No 9, 1977.

**Just in the zone of the 5th Guards Tank Army.

In the course of meeting engagements, particularly important significance was assumed by maneuvering, as a result of which the necessary grouping of men and weapons was established, the assuming of the best initial position and the employment of effective methods for defeating the enemy were ensured. In a majority of instances, the aim of the maneuver in a meeting engagement was to quickly split the enemy forces and by subsequent decisive actions to destroy them piecemeal (see Diagram 2).

In those instances when the limited time and situational conditions did not permit maneuvering for coming out in the flank and rear of the enemy grouping or when it had been securely suppressed by artillery fire and air strikes, the best was a frontal attack by large forces of tanks and infantry on narrow sectors of the front. Here there was an opportunity in a short period of time in the sector of the main thrust to establish the necessary superiority in men and weapons, to split up the enemy grouping and develop the offensive in depth.

In making a frontal attack, the time was reduced for preparing for the engagement, it was easier to achieve reliability in organizing and maintaining cooperation and control as this had already been established in the course of the operation, while the troops entered the engagement in the same grouping in which they conducted the operation. Moreover, there was the massed use of men and weapons in the decisive sector and this provided greater security of the engagement's success.

The making of a series of divisive thrusts along the shortest axes was a variety of the given method of defeating the enemy in meeting engagements and this occurred in clashing with the enemy in March 1944 in the area of Proskurov.⁵ The First Ukrainian Front in this sector of pursuit had ready troop groupings. This made it possible for it to enter the engagement from the march and this developed along a broad front involving up to 700 tanks and SAU and more than 900 guns and mortars on both sides. As a consequence of the spring mud which impeded the maneuvering of the troops as well as insufficient fire support (in a number of formations there was no artillery), the engagement was drawn out up to 4.5 days.⁶

When the operational situation allowed, the Soviet troops employed such an effective method of defeating the enemy as attacking the flank and rear of its grouping. An instructive example of conducting a meeting engagement with an attack against the flank combined with a frontal thrust would be the defeat of the enemy XXIV Tank Corps by the troops of the 4th Tank Army of the First Ukrainian Front in the area of Kielce during the Sandomierz-Silesian Operation.⁷ For the planned withdrawal of its troops, the Nazi Command endeavored at any price to hold the lines of communications running to the north of Kielce. For this purpose it undertook a counterstrike by the XXIV Tank Corps against the advancing troops of the 4th Tank Army in order to prevent its further advance deep into the defenses and stop the further advance of the front's troops. The VI Guards Mechanized Corps of the 4th Tank Army which in the course of the previous combat operations had broken out ahead changed the direction of its offensive, it came out in the Nazi flank and by joint attacks of the VI Guards Mechanized Corps from the flank and the X Guards Tank Corps from the front which initially had tied down the enemy, in cooperation with other formations, defeated the enemy grouping.

The effectiveness of defeating the enemy by coming out in its flanks was that the attack was made against the most vulnerable point. This made it possible to seize the initiative from the very outset, to put the enemy in bad conditions and defeat it piecemeal. However, the use of such a method was possible with an advantageous operational position of the assault troop grouping in relation to the enemy, the presence of a reserve (second echelon), definite time and terrain which favored the carrying out of the maneuver.

In a number of meeting engagements the troops were forced simultaneously to conduct various types of combat. Thus, in the course of the tank meeting engagement of the 5th Guards Tank Army at Prokhorovka in July 1943, defensive actions combined with counterattacks were conducted in some sectors, meeting encounters developed on others while in still others an offensive was undertaken against the enemy forces which had gone over to the offensive with the simultaneous repelling of counterattacks.

Of great importance was increasing the effort in the course of meeting engagements and this was done, as is seen from Table 3, predominantly by the second echelons and reserves. For example, in the Belgorod-Kharkov Operation of the Voronezh Front in the meeting engagements conducted in August 1943, the reserves of the front (the 47th Army) and Hq SHC (4th Guards Army) played a crucial role in defeating the enemy counterstrike groupings (see Table 3).

Table 3

Increase in Effort During Meeting Engagements*

Field Force (Formation) Involved for Increasing Effort	Area and Time of Commitment to Engagement	Place of Field Force (Formation) in Operational Configuration of Front (Army) and Form of Maneuver
5th Guards Tank Army of Second Belorussian Front	In area of Wormditt, 30 Jan 45	Army was shifted from external perimeter of encirclement and without a halt attacked the enemy grouping endeavoring to break out of encirclement
VIII Mechanized Corps of Second Belorussian Front	In area of Wormditt, 30 Jan 45	Front's reserve, corps attacked jointly with 5th Guards Tank Army
I Rifle Corps of 43d Army of First Baltic Front	In area of Birzhay, 3 Aug 44	Corps was removed from right, less active army flank and re- grouped to left flank to area of Birzhay to meet enemy counter- thrust grouping
Reinforced tank brigade of XXIX Tank Corps of 5th Guards Tank Army	In area to north of Krupki, 28 Jun 44	Committed to battle from army reserve in defeating enemy 5th SS Tank Division
IX Mechanized Corps of 3d Guards Tank Army	In area of Fastov, 8 Nov 43	Army second echelon committed to engagement from behind army right flank
93d Separate Tank Brigade of 4th Guards Tank Army	In area of Gumenicc, 13 Jan 45	Army reserve, committed to en- gagement between VI Guards Mech- anized Corps and X Guards Tank Corps

* Table compiled from materials of the TsAMO [Central Archives of the Ministry of Defense], VOYENNO-ISTORICHESKIY ZHURNAL, No 4, 1973; No 9, 1977.

In the course of many meeting engagements, the maneuvering of men and weapons was carried out by regrouping them from one sector to another. The most indicative example would be the regrouping of the 5th Guards Tank Army in a meeting engagement in January 1945 in the area of Wormditt in defeating the surrounded East Prussian Nazi troop grouping. In order to prevent the units of

the 4th German Army which were breaking through to the west escape from encirclement, the 5th Guards Tank Army was taken from the external perimeter, without a halt it attacked in cooperation with the VIII Mechanized Corps and the formations of the 48th Army reinforced by the VIII Guards Tank Corps which were fighting on the inner perimeter of encirclement, and defeated the enemy grouping which had broken through, thwarting its attempts to break out of the encirclement.

An analysis of the experience of the Great Patriotic War makes it possible to draw a number of conclusions. First of all, it must be pointed out that regardless of the diversity of meeting engagements, a number of common traits were inherent to them: an intense struggle to seize and retain initiative; the commitment of the troops to the engagement, as a rule, without a halt; the development of combat operations in the entire zone of advance; the limited time to organize the engagement; the constant and continuous maneuvering of troops; the going over for a brief period of time from the offensive to repelling enemy attacks and the resumption of the offensive and so forth.

The increased fire and attack capabilities of the troops led to a broadening of the scale of meeting engagements and this, in turn, involved an increased role of the front-level levels of command in their organization and conduct.

The diverse conditions for the rise of meeting engagements caused the employment of different methods of conducting them. Here the increased qualitative and quantitative indicators of the aviation and artillery showed the desire of the belligerents to cause significant losses to the enemy even before the start of their immediate clash.

The tank and mechanized troops played the crucial role in the meeting engagements. The tank (mechanized) corps and armies were the basic means for developing success in the offensive operations and a highly maneuverable means of attack in making counterthrusts on the defensive. Such a purpose for them also determined in a number of instances their conduct of meeting engagements since the enemy aimed its reserves primarily against our troop groupings which were active and had achieved the greatest success.

The basic factors which determined the success of the meeting engagements were: all-round preparation for the engagement; the choice of effective methods of conducting it; anticipating the enemy in making fire strikes, in deploying the troops and establishing the necessary grouping of men and weapons; the rapid increase in the force of the attacks in the course of combat operations.

FOOTNOTES

¹ TsAMO SSSR [Central Archives of the USSR Ministry of Defense], folio 332, inv. 4948, file 387, sheet 56.

² "Belgorodsko-Khar'kovskaya nastupatel'naya operatsiya Krasnoy Armii" [The Belgorod-Kharkov Offensive Operation of the Red Army], Moscow, Izd. Voennoy akademii imeni M. V. Frunze, 1945, pp 30, 31.

³ VOYENNO-ISTORICHESKIY ZHURNAL, No 9, 1977, p 32.

⁴ TsAMO, folio 300, inv. 3070, file 85, sheets 13-14.

⁵ "Operatsii Sovetskikh Vooruzhennykh Sil v Velikoy Otechestvennoy voyne 1941-1945" [Operations of the Soviet Armed Forces in the Great Patriotic War of 1941-1945], Moscow, Voenizdat, Vol 4, 1959, pp 133-134.

⁶ VOYENNO-ISTORICHESKIY ZHURNAL, No 9, 1977, pp 27, 28.

⁷ "Operatsii Sovetskikh Vooruzhennykh...", Vol 4, pp 133-134.

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10272

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SOVIET VIEW GIVEN ON U.S. MILITARIZATION OF SPACE

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 66-74

[Article by Twice Hero of the Soviet Union, USSR Pilot-Cosmonaut, Candidate of Technical Sciences, Lt Gen Avn V. Shatalov, and Hero of the Soviet Union, Candidate of Military Sciences, Maj Gen Avn L. Shishov: "America's Use of Space for Military Purposes"]

[Text] Cosmonautics is an aggregate of scientific and technical fields providing the development of space and extraterrestrial objects using automatic and manned space devices.¹

Space research has significantly advanced the horizons of scientific cognition and has led to the intensive development of many sectors of science, technology, production and the national economy. Due to cosmonautics, mankind has begun the extensive development of near space, and the direct study of the solar system and has taken major steps on the path to understanding the fundamental patterns of the universe's evolution.

The launching of the first Soviet earth satellite on 4 October 1957 and the flight of the world's first cosmonaut Yu. A. Gagarin on 12 April 1961 opened the way into space. From the very first days of the development of space, the Soviet Union with complete forthrightness has stated the peaceful intention of its programs. In the Appeal of the CPSU Central Committee, the Presidium of the USSR Supreme Soviet and the Soviet government on the flight of Yu. A. Gagarin, it was stated: "Victories in the conquering of space...are being put by us not into the service of war but into the service of the peace and security of peoples."² Over a historically short interval of time, cosmonautics in our nation, due to the constant concern of the Communist Party and the Soviet government, has undergone all-round development, having become an independent sector of the national economy, the role and importance of which are constantly growing.

The Soviet Union holds many firsts in the development of space: the first flight to another celestial body, the moon, and the photographing of its back side, the creating of satellites of the sun, moon and Venus, a soft landing on the moon, Venus and Mars, a group flight of manned spacecraft, a walk by a cosmonaut in open space and so forth. A majority of the space records set, including the longest flight, have been established by Soviet cosmonauts.

Somewhat later, launchings commenced of American space devices. On 31 January 1958, the U.S. announced that it had orbited an earth satellite Explorer-1. Soon thereafter, on 17 March 1958, with the aid of a vanguard carrier missile, the next satellite was launched. The first flights of the U.S. spacecraft were basically aimed at carrying out scientific research tasks. The National Aeronautics and Space Agency (NASA) was set up for the leadership and coordination of all projects. Seemingly the development of space would be carried out along peaceful lines as the Soviet Union had actively favored and was favoring. However, the U.S. reactionary circles and primarily the representatives of the military-industrial complex and the Pentagon strategists, immediately began to examine the possibility of using spacecraft for military purposes. Even in February 1958 under the U.S. Defense Department a future projects agency was established and this provided leadership over the development of the military space programs.

On 28 February 1959, the United States launched its first military-purpose earth satellite, Discoverer-1, designed for conducting space reconnaissance, primarily on the territories of the USSR and the socialist commonwealth countries. This launch marked the beginning to a new stage of the U.S. military space program in which its militaristic essence has become evermore apparent. At this stage the U.S. Defense Department carried out a series of organizational measures aimed at intensifying work in the area of militarizing space. The United States became the first country which in October 1959 launched a missile for intercepting the Explorer-6 satellite. In 1961, a Command for the development of U.S. Air Force Weapons Systems was established in the U.S. Air Force on the basis of leadership over scientific research. One of its important bodies was the Space Weapons System Department which employed over 3,500 scientists, engineers, operational workers and service personnel. It was in charge primarily with the development management of all the U.S. basic space systems.

For the practical resolving of questions concerning the use of space for military purposes, the American Command even at the beginning of the 1960's began to set up special units. The 6594th Test Wing was organized to support the launchings of military spacecraft as well as for processing the results of the flight missions. As was pointed out in the American press, the establishing of this wing "marked a beginning to organizing U.S. space armed forces."⁴ The wing included launch subdivisions located on the Western and Eastern missile ranges, service groups, tracking stations as well as special groups which were stationed on the Hawaiian Islands for retrieving containers with intelligence information dropped from the satellites. The number of personnel in the wing was around 3,000 persons. In June 1961, at Edwards Air Force Base in California, a school for astronaut pilots was opened up. At the same time, intensive development was started on space systems for the control and support of troop combat operations.

The vice president of the English Society for Interplanetary Messages, K. Gatland, in a popular scientific book entitled "Cosmonautics of the Next Few Years"⁵ on the basis of data in the American press, has pointed out that the first spacecraft were designed to carry out various military-type missions such as early warning, conducting reconnaissance, providing for communications, global observation of meteorological conditions as well as navigation support.

After the launching of the first reconnaissance satellite, their systematic flights began in the aim of conducting global reconnaissance of the most important objects such as: military and naval bases, airfields, ballistic missile positions, elements of control and command systems and so forth. A network of ground stations was established for monitoring, controlling and collecting information as well as equipment for the semiautomatic and automatic processing and analysis of the obtained reconnaissance information. From 1961 they began launching a new type of reconnaissance satellite, the Samos, which carried a camera with high resolution as well as television cameras.

At the same time, satellites were being developed and launched under the MIDAS Program. These were designed for the early warning of ballistic missile launches as well as the launching of space devices. The system was based upon the principle of detecting thermal radiation occurring during the missile launch. It was assumed that with the aid of several earth satellites put into polar orbits and having infrared sensors it would be possible to increase the warning time for a missile attack against the continental United States from 15 to 30 minutes, thereby providing a maximum possible time for the detection and destruction of the warheads entering the atmosphere by the antimissile defense means.

The Pentagon has given great importance to the meteorological, navigational and geodetic support of the armed forces by using earth satellites. From April 1960 they began launching weather satellites of the Tiros type and later the Nimbus which carried television cameras and infrared devices. Using these television photographs were obtained of the earth's cloud cover, zones of precipitation and in addition the temperature was established in various points of the earth's surface. The data received from the satellites were used in compiling weather forecast, for systematizing data on the feature of the spread of cloudiness in various regions as well as for storm and hurricane warnings.

Simultaneously with carrying out the program for the launchings of weather satellites there were also the launches of the first Transit navigation satellites for supporting the navigation of nuclear submarines which carried the Polaris missiles. With the aid of the Transit System, the accuracy of determining the coordinates of the submarines was 0.2-0.3 km and this, in the opinion of American military specialists, made it possible to significantly increase the effectiveness of their combat employment.

For carrying out tasks related to the development of the geodetic network, fixing the launching positions of ballistic missiles as well as for clarifying the shape and dimensions of the earth, satellites of the Anna, Secor and later Geos types were launched.

At the start of the 1960's, a whole series of space communications system satellites was developed. Among these first of all we must put the relay satellites of the Courier, Echo, Telestar, Relay and Syncom types. These satellites were employed for carrying out the tasks of two-way telephone and telegraph communications, transmitting video information and relaying data in various military communications systems. For example, the Syncom-2 earth satellite was employed for this purpose during the aggressive U.S. war in Vietnam.

On 22 November 1961, the U.S. Air Force began launching secret satellites. Even previously they had begun developing combat space systems with which the Pentagon proposed to win supremacy in space. A practical measure in this direction was the working out of a program for developing the Dyna-Soar orbital boost-glide aircraft, the first stage of which was the testing of the X-15 experimental hypersonic aircraft. As a total over 150 flights were made reaching an altitude of 108 km and a maximum speed of 7,300 km per hour ($M = 6.72$ at an altitude of 30 km) with a duration of autonomous flight of about 25 minutes. In the course of these testing was carried out for the stability and controllability of the aircraft, particularly at great altitudes, the equipment, individual assemblies, heat protecting devices and other systems which were to be developed for the boost-glide aircraft were evaluated.

U.S. Air Force representatives felt that the boost-glide aircraft could be employed for carrying out global reconnaissance missions using high resolution photographic systems. As special bombers the boost-glide aircraft could deliver nuclear weapons to pin-point targets. They could also be given the mission of intercepting satellites for the purpose of inspecting them and, when necessary, also destroying them.

Regardless of the extensive publicity and repeated statements by the Air Force and the Boeing firm on the great capabilities of the Dyna-Soar boost-glide aircraft, work on this project at the end of 1963 was halted since the state of the U.S. missile and space industry at that time and the level of production methods did not make it possible to realize the developed project.

In the 1960's the United States developed several projects for combat space systems based on earth satellites. According to one of these, the antimissile carrier satellites were to be put into a polar orbit (altitude 500-700 km) with an orbiting time of 94-98 minutes. These satellites were to be employed for destroying (upon command from the earth) satellites, spacecraft and ballistic missiles.

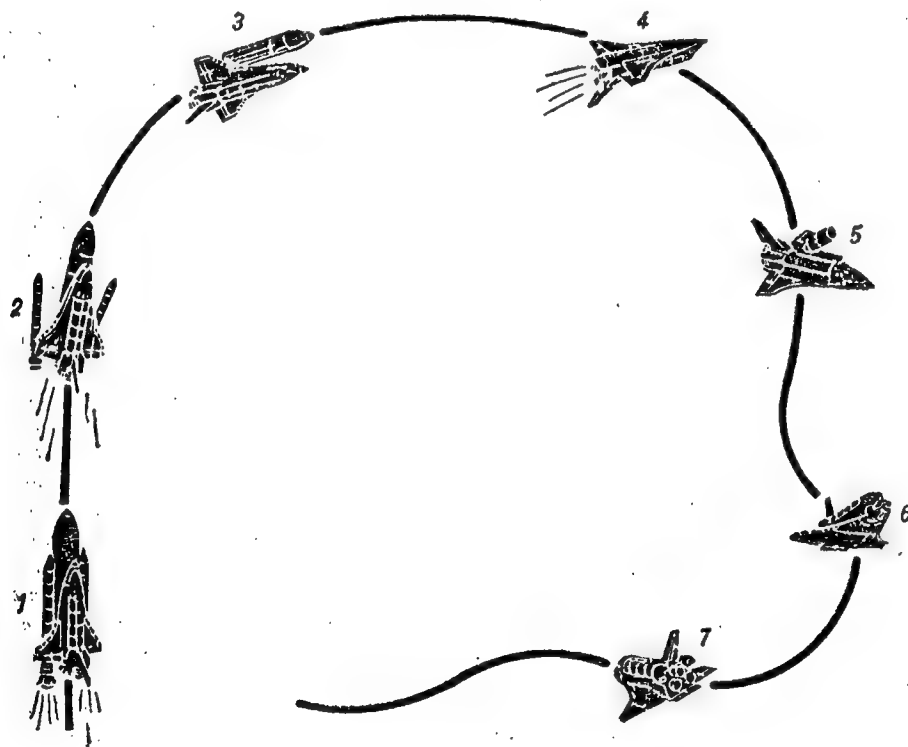
In 1972, the United States began developing the multipurpose Shuttle space system which is based on a reusable earth-orbit-earth manned spacecraft of the same name. In addition, the system includes ground launch-landing and repair facilities, a command-metering complex based on a satellite data relaying system and a ground command center. There are also plans to employ the interorbital tow-craft and Spacelab in the Shuttle system.

In the opinion of U.S. military specialists, the Shuttle possesses important indicators: multiple use, the possibility of broad maneuvering (up to $\pm 2,000$ km) on the descent and landing leg, great cargo-carrying capacity as well as the possibility of landing the orbital stage on a designated airfield, making it possible to carry out a broad range of military tasks.

With the completion of work on the development of the Shuttle, in April 1981 its first flight was made with the Columbia orbital stage and with the exacerbation of the international situation in the American press there appeared many new ideas on employing orbital aircraft, particularly for military purposes. Actively joining in the propagandizing of these ideas were representatives of the Air Force and NASA, various military reviewers, leaders of the Defense Department, prominent politicians and even the U.S. President.

According to data in the journal AVIATION WEEK AND SPACE TECHNOLOGY⁶ and the newspaper NEW YORK TIMES,⁷ the former U.S. President Carter on 11 May 1978 signed a directive which defined America's task in the area of space research and utilization. According to it the United States was to take the necessary measures to maintain a leading position in space technology using the Shuttle spacecraft as the main means of transport.

The basic military-space programs and military experiments conducted using the Shuttle spacecraft, in the opinion of American military specialists, will be: the further development of space systems (reconnaissance and so forth), the development of space-based laser weapons, new means for guiding and tracking antisatellites, the carrying out of testing for ballistic missile warheads and small-sized aerospace devices as well as carrying out special technological tasks (developing large orbital stations, repair work and so forth).



Schematic Diagram for the Flight of the Shuttle Spacecraft:
 1--Lift-off; 2--Separation of solid-fuel boosters; 3--Separation of external fuel tank; 4--Additional acceleration using orbital maneuvering engines and placement in orbit; 5--Operations in orbit; 6--Re-entry of atmosphere; 7--Landing

An important area in the employment of the reusable Shuttle spacecraft is support for the functioning of the grouping of U.S. military satellites in space and the increasing of this grouping. Over the next decade in the interests of the U.S. Defense Department there plans to make 113 Shuttle flights and this is around 40 percent of the planned launches.

Recent years have been characterized by a significant increase in the activities of the U.S. Defense Department to develop military systems for waging war in space and from space. This creates a real threat to turn near space into the most explosive theater of military operations. In responding to the questions of the newspaper PRAVDA, the General Secretary of the CPSU Central Committee and Chairman of the Presidium of the USSR Supreme Soviet, Comrade K. U. Chernenko, emphasized that the Soviet Union for more than a year now has been working for an agreement aimed at preventing the extension of the arms race into space. "We have constantly raised this question before the U.S. leadership. We have done this because we are clearly aware to what terrible consequences the militarizing of space would lead," said Comrade K. U. Chernenko. "At the same time, the American President has recently officially notified the U.S. Congress that the government is to begin carrying out a broad arms race program in space and does not intend to seek agreement with the Soviet Union on preventing the militarization of space supposedly due to the difficulties of supervision."⁸

In addition to the more than 20 bodies of the U.S. Defense Department involved in space activities, in 1982, the Air Force Space Command was established. A year later an analogous command was formed in the Navy. At present there are plans to establish a Joint Space Command.^{8a}

Particularly reactionary politicians and representatives from the U.S. military-industrial complex are making a great effort to accelerate the process of developing and deploying laser weapons in space. Here many American specialists feel that the laser is an ideal type of weapon for use in space since it possesses an enormous speed of beam propagation and provides greater range against fast-moving targets.

As has been announced in the magazine AVIATION WEEK AND SPACE TECHNOLOGY,⁹ in December 1980, a seminar was held in New York on the state of development and prospects of employing laser weapons. Representatives from the U.S. Defense Department and Congress at this seminar urged the rapid deployment of laser battle stations in space with a broad range of combat missions, including the defense of American satellites, intercepting intercontinental ballistic missiles on the powered leg, hitting strategic bombers as well as destroying surface ships and ground installations.

According to data in the bulletin DEFENSE SPACE BUSINESS DAILY,¹⁰ the U.S. Defense Department and individual firms are examining the possibility of developing small-sized aerospace devices (orbital aircraft) for military purposes. As devices for placing in orbit they have examined the Shuttle, a rocket sled or a specialized carrier aircraft. The basic project designed to be carried out in the second half of the 1980's envisages the development of a multiple-use aircraft with a bearing shell.

One must also point out the ASAT antisatellite system which has been widely publicized in the United States and is designed to destroy orbiting spacecraft. The system includes a ground command post and F-15 aircraft which are the carriers of the antisatellite missiles. Recently the U.S. Air Force has begun testing this system. From onboard the F-15 fighter an antisatellite missile was launched to a great altitude in space without guidance to any specific

object. Subsequently they plan to orbit special "target satellites." Full-scale deployment of the ASAT system is to be carried out in 1987.

In line with the significant increase in the combat missions entrusted to spacecraft, the American press¹² has published data on the construction of a new joint space operations center near Patterson Air Force Base in Colorado. It is designed for controlling the military satellites and the flights of the Shuttle with military payloads. As is assumed, it will begin operating in 1985.

According to statements in the American press,¹³ the U.S. Air Force Space Command now includes a special group for the development of space operations. It should become the sole coordinating center for the actions of the Defense Department and NASA for the military-end Shuttle flights and bring together all work relating to their support, starting from the training of the personnel of the command center and ending with the making up of the payloads for the launches and orbiting operations. "Here an agreement has been concluded between NASA and the U.S. Defense Department in accord with which the NASA director upon an official request from the Air Force Command can give it priority in preparing a Shuttle flight and in conducting operations in orbit.... For turning over control of the flight to the Defense Department there must be a joint agreement of the secretary of defense and the NASA director that it is a special-category flight in the interests of national security...."¹⁴

On 23 March 1983, the U.S. President Reagan at the White House gave an extensive statement on the questions of U.S. military policy. He stated directly that his administration would prepare to conduct war in space and that this supposedly pursued the goal of "strengthening U.S. security." The president's words have been reinforced by deeds. The American administration has generously allocated money for military purposes. The Pentagon's "space budget," writes the newspaper LOS ANGELES TIMES, already has risen up to 7.4 billion dollars. According to data in the American press, the plans of the Reagan government by 1988 envisage a 12-fold increase in allocations on the research and development of space-based laser systems. The White House is planning to allocate over the next 5 years some 27 billion dollars and by the year 2000, 95 billion. The cost of the antimissile defense program with space-based elements and which has been called "defensive," in the estimate of the former U.S. Secretary of Defense G. Brown, can exceed a trillion dollars.¹⁵ According to data of the American Congress, around 60 percent of all the space launches in the United States is for military purposes.¹⁶

Thus, the United States has taken a new step in the arms race, thereby having ignored the proposal of the Soviet Union to introduce a moratorium on the employment of antisatellite weapons.

The plans announced by the U.S. president to deploy a new wide-scale antimissile defense system which presupposes the use of laser weapons is in direct contradiction to the provisions of the Soviet-American agreement on the limiting of the antimissile defense systems.

As for the Soviet Union, its position on preventing an arms race in space remains unchanged. The USSR is firmly in favor of banning the use of space

devices for military purposes and affirms its readiness to make a maximum effort so that the sinister plans of shifting the arms race into space do not become a reality.

Even in 1983, the Soviet Union unilaterally assumed the obligation not to put antisatellite weapons into space.

On 29 June 1984, the Soviet government again proposed to the U.S. government that they commence talks on preventing the militarization of space. The Soviet Union has proposed agreement on the banning and eliminating of an entire range of weapons which are space means of attack, including the space-based anti-satellite and antimissile systems as well as any land-, air- or sea-based devices designed to hit objects in space. However, the American administration as before declines to hold talks on preventing the militarization of space and is carrying out programs aimed at turning space into a staging area for aggression and into a source of threat for mankind.¹⁷

FOOTNOTES

¹ "Sovetskaya Voyennaya Entsiklopediya" [Soviet Military Encyclopedia], Moscow, Voenizdat, Vol 4, 1977, p 394.

² PRAVDA, 13 April 1961.

³ [Not in text]

⁴ AVIATION WEEK AND SPACE TECHNOLOGY, May 1961.

⁵ K. Gatland, "Kosmonavtika blizhayshikh let" [Astronautics of the Sixties], translated from the English, Moscow, Voenizdat, 1964, p 189.

⁶ AVIATION WEEK AND SPACE TECHNOLOGY, Vol 108, No 22, 1978, p 23.

⁷ NEW YORK TIMES, 22 April 1978.

⁸ PRAVDA, 9 April 1984.

^{8a} KRASNAYA ZVEZDA, 24 July 1984.

⁹ AVIATION WEEK AND SPACE TECHNOLOGY, Vol 113, No 23, 1980, pp 36-37.

¹⁰ DEFENSE SPACE BUSINESS DAILY, Vol 102, No 14, 1979, p 92.

¹¹ [Not in text]

¹² AIR FORCE TIMES, No 7, 1980, No 2.

¹³ AVIATION WEEK AND SPACE TECHNOLOGY, Vol 113, No 13, 1980, p 48.

¹⁴ AEROSPACE DAILY, Vol 104, No 36, 1980, p 282.

¹⁵ KRASNAYA ZVEZDA, 24 July 1984.

¹⁶ Ibid., 26 July 1983.

¹⁷ PRAVDA, 30 June and 7 July 1984.

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10272

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WORLD WAR II: AMMUNITION SUPPLY IN ARCTIC CONDITIONS TRACED

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 81-82

[Article by Col Gen (Ret) I. Volkotrbenko: "Ammunition Supply for the Troops in the Operation to Defeat the Enemy in the Arctic"]

[Text] The unique geographic conditions and the particular features of the theater of war in the Arctic made an impression on the work of the artillery supply service. The areas of the army and troop rear here were located on very rugged terrain abounding in numerous lakes, swamps and rivers. The Kolskiy Zaliv [Kola Gulf] was a major water obstacle separating the troops of the 14th Army from the rail lines of communications and the front supply depots. All of this created significant difficulties in the operation of both the operational and troop rear services.

The rail delivery of ammunition for the 14th Army started during the first half of September 1944. Ammunition was dispatched from the field front artillery Dumps 1493 and 1374 located in the areas of Obozerskaya and Kodino Stations. With a single railroad the most convenient point for receiving the rail transports with ammunition was Kola Station to the south of Murmansk. Here the army field artillery Dump 1236 (chief of the dump, Maj Rogalev) was established. Ammunition from this dump by small rail consists (up to 10 cars) was delivered to the spur of the coastal shipping pier of the Murmansk Port for further ferrying of freight to the western shore of Kolskiy Zaliv.

In the port of Murmansk they set up a section of Dump 1236 which was entrusted with the receiving of the carriers with the ammunition and transloading them from the railroad to the water transport. On the western bank of the Gulf, at Mishukov harbor, the ammunition was received by the field artillery Dump 3137 (chief, Tech-Lt Solomykin), reloaded onto motor transport and dispatched to the troops to the divisional supply refilling points. Transport was carried out over the Mys Mishukov--Titovka road. By the start of the operation the troops of the 14th Army had 1.6-3.5 units of fire of the most widely used shells and cartridges.¹

Starting in October (after the liberation of Petsamo and Linakhamari by the Soviet troops), ammunition also began to be delivered by water transport over the sea from Murmansk to Linakhamari (12 km to the north of Petsamo). The sea

crossing of the transports usually took 18-20 hours. From the port of Linakh-mari the ammunition was then delivered by motor transport to the troops and to the sections of the army artillery dump.

For the sea transporting of cargo the rear services of the 14th Army had two barges, three sailboats and one ferry with a cargo carrying capacity of 750 tons. The ammunition was loaded on the vessels using the shipboard equipment. During the operation, the sea transport carried around 3,000 tons of just ammunition for the 14th Army.

In line with the difficulties in the operation of transport, for delivering ammunition airplanes of the U-2 type were also employed. As a total they made 256 aircraft sorties, delivering 1.1 million cartridges, 1,500 hand grenades, 1,843 artillery shells and 1,890 mortar shells. The ammunition was delivered from the sections of army artillery Dump 3137 and unloaded at the airfield.²

The CXXVI Light Rifle Corps which was fighting on the left flank of the army with a total lack of roads was supplied under particularly difficult conditions. The supplies of ammunition were delivered here to the battle formations of the units by packs on horses and reindeer and sometimes carried by soldiers. A horse pack usually weighed 110-120 kg and a reindeer pack 35 kg.

In the course of the offensive as the units moved forward, the demand for ammunition increased and pack transport was unable to deliver it over a distance of 100-120 km. Units of the corps began to feel a lack of ammunition. For replenishing the supplies, around 500,000 cartridges were turned over to the corps from the ammunition delivered by the U-2 aircraft.³ Although in the operation the army consumed just 222,000 artillery and mortar shells (268 carloads), the artillery supply service had to make a great effort to promptly supply the units and formations with ammunition under the severe Arctic conditions.

FOOTNOTES

¹ TsAMO SSSR [Central Archives of the USSR Ministry of Defense], folio 363, inv. 200796, file 2, sheet 211.

² Ibid., folio 21, inv. 12079, file 53, sheet 63.

³ Ibid., sheet 102.

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10272

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BIOGRAPHIC DATA ON ARMY GEN A. T. STUCHENKO GIVEN

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 83-86

[Article by Hero of the Soviet Union, Hero of Socialist Labor, Army Gen I. Tret'yak: "His Enviably Fate (On the Anniversary of the 80th Birthday of Army Gen A. T. Stuchenko)"]

[Text] I first met Andrey Trofimovich Stuchenko* at the beginning of 1943. At that time he had assumed command of the 29th Guards Rifle Division which had rich combat traditions. At one time it had distinguished itself in the battles at Lake Khasan and for this had received the Order of the Red Banner. It was awarded the high title of guards in the Battle of Moscow on the historic Borodino Field.

The division was conducting heavy defensive battles, firmly blocking the Moscow --Minsk Highway in the area of km 170, not far from Gzhatsk (now Gagarin). The new commander immediately appeared on the forward edge and we, the frontline veterans, immediately noticed his desire to go in detail into all questions of the combat situation, his smartness and organization. He also endeavored to instill these qualities in his subordinates. In the course of the battles, we got to know Andrey Trofimovich better and better. Although he was rather reluctant to talk about himself, little by little certain pages of his biography became clear.

The son of a worker, since childhood he had hated the exploiters. His father who had fought actively against the existing system had been repeatedly out of work and then the threat of hunger hung over the Stuchenko family. With good reason the desire to become a fighter for Soviet power developed in Andrey Stuchenko in his early years. Even in the winter of 1918, when the father along with other workers at the Kiev Arsenal Plant were preparing an armed

* Andrey Trofimovich Stuchenko was born on 17 (30) October 1904 in Kiev in a worker family. His life has led from a "boy" in a haberdashery store to a deputy of the USSR Supreme Soviet, from a private machine gunner to the commander of a military district.

For more detail on A. T. Stuchenko, see: "Sovetskaya Voyennaya Entsiklopediya" [Soviet Military Encyclopedia], Moscow, Voenizdat, Vol 7, 1979, p 583; VOYENNO-ISTORICHESKIY ZHURNAL, No 10, 1974, pp 124-127.

revolt against the Central Rada, the 14-year-old juvenile carried out individual assignments of his elders.

It was quite natural that A. T. Stuchenko, later being in Chernigov, enrolled in a cavalry detachment under the headquarters of the 12th Army to combat banditry. But he did not serve long in this detachment as he fell ill with typhus and landed in Belaya Tserkov. In 1921, after recuperating Stuchenko volunteered for one of the battalions of the famous Chapayev 25th Rifle Division. But the new type of army immediately needed command personnel and the young fighter studied industriously. In 1923, he completed the cavalry courses and in October 1926 the 5th Yelisavetgrad School. After this he received an appointment to the 34th Rostov Cavalry Regiment of the 2d Brigade of the 6th Chongar Cavalry Division of the 1st Horse Army stationed in the town of Rogachev. Here Andrey Trofimovich successively held the positions of a machine gun platoon commander, a machine gun squadron commander, and the assistant chief of operations for the division staff. The young commander was demanding on himself and subordinates, he constantly increased the level of his knowledge and steadily taught the men military affairs. As a result, initially the platoon and then the squadron under his command became the best in the division for all indicators of combat training and service while the squadron, in addition, received an army-wide prize for successes in weapons training.

A particularly stirring and happy event occurred in Stuchenko's life in December 1929: he was admitted to the ranks of the Communist Party. Energetic and placing service matters higher than everything else, the Red Commander Stuchenko rightly moved up in service. In October 1935, he was appointed to the position of chief of staff of the 94th Cavalry Regiment of the 24th Cavalry Division and in 1936, Capt A. T. Stuchenko became a student at the Military Academy imeni M. V. Frunze. The years of study in its walls provided the keen officer a great deal and significantly broadened his viewpoint.

After completing the academy in 1939, Andrey Trofimovich successively held the positions of the chief of the operations section of the staff of the III Cavalry Corps in Minsk and then deputy cavalry inspector of the front group established for troop leadership in the Far East and combat operations in the Khalkhin-Gol area. From October 1940, A. T. Stuchenko was a student on the operations faculty of the Military Academy for Command and Navigator Personnel of the Air Forces.

At the outset of the Great Patriotic War, Andrey Trofimovich was in command of the 58th Cavalry Regiment of the 45th Cavalry Division concentrated in Gzhatsk. The enemy was rushing toward Moscow. During this time the group of Gen L. M. Dovator was established for fighting in the rear of the enemy troops. The August 1941 raid of the group was a glorious page in the chronicle of the Great Patriotic War. In the course of it the regiment of Lt Col Stuchenko also fought courageously. The commander himself showed exceptional bravery and organization. This is what the newspaper PRAVDA wrote on 14 September 1941: "The signal was given and the fire softening up of the attack started. The Nazis were stunned. At this moment Lt Col Stuchenko leapt forward on a horse. He turned facing the forest and commanded:

"'Attack!'

"The Demidov squadron in an extended line with sabers dashed headlong from the forest and rushed forward. A loud 'Hurrah!' rang out over the glade.... The horse was killed under Commander Stuchenko. Another steed was brought up for him. Again Stuchenko's saber cut down the enemy. The second horse was killed. The horseman was unharmable. On a new steed he again led the way. The third horse was wounded and Stuchenko, having received a fresh steed, continued the battle."

In September 1941, Andrey Trofimovich Stuchenko was appointed the commander of the 45th Cavalry Division which was conducting heavy delaying actions against significantly superior enemy forces. Having fallen into an encirclement, the division during the last days of October in individual groups broke through to friendly troops in the area of the 49th Army at Serpukhov. This was a time of the grinding, bloody battles on the approaches to the capital. And at that time at Moscow the cavalymen from the 45th Cavalry Division skillfully and courageously carried out their military duty.

From January through June 1942, Stuchenko was in command of a cavalry regiment and temporarily the 20th and 4th Guards Cavalry Divisions, in August he was appointed the commander of the 108th Rifle Division and at the beginning of 1943, the 29th Guards Rifle Division. At that time I was a battalion commander. Then our division, like the other formations of the 5th Army of the Western Front, was on the defensive, but was preparing for an offensive which commenced on 2 March 1943. In the battles for Gzhatsk which ended on 6 March by its capture, we had a time to properly assess the commander qualities of Andrey Trofimovich. He conducted reconnaissance in a most careful manner, he skillfully organized combat, he issued combat orders and organized cooperation always in the field. He taught us to protect the lives of the men and do more work ourselves in the field to organize combat.

I recall a characteristic detail: over the entire time of our joint service the division never retreated. It, as a rule, was employed in mobile forms of combat. For many years, A. T. Stuchenko had served in the cavalry and he intelligently employed fluid methods of combat also in a rifle division. In liberating the towns of Opochka and Rezekne, Maj Gen A. T. Stuchenko commanded the mobile group of the 10th Guards Army consisting of the 29th Guards Rifle Division mounted on motor vehicles, the 78th Separate Tank Brigade and other reinforcements. How Andrey Trofimovich commanded the units in combat deep in the enemy defenses and which largely predetermined the success of the operation was very instructive for us, the young officers. For skillful leadership of the formation on 30 July 1944, A. T. Stuchenko received the Order of Suvorov 2d Degree.

In August 1944, Andrey Trofimovich was appointed the commander of the XIX Guards Rifle Corps which under his leadership successfully defeated the enemy in the forests and swamps of the Luban Depression and in a subsequent rapid march came out in the flank and rear of the Riga enemy grouping. And before the end of the war, the guardsmen of the corps in cooperation with other formations and field forces of the front destroyed the enemy Kurland grouping.

In a combat recommendation for Maj Gen A. T. Stuchenko, the commander of the 10th Guards Army, Gen M. I. Kazakov, wrote: "The fighting, growing and brave

general...is able to prepare and conduct modern offensive combat for the corps. He is personally brave and decisive. He is demanding on himself and others. He has earned authority...."

After the war, the participant of the historic Victory Parade of Troops of the Leningrad Front, A. T. Stuchenko, up to September 1951 was in command of a formation and then studied on courses at the General Staff Military Academy. From December 1952 through 1955 he held a number of responsible positions, and from January 1956 through April 1968 he was successively in command of the troops of the Northern, Volga and Transcaucasian Military Districts. In 1968, Andrey Trofimovich headed the Military Academy imeni M. V. Frunze. He devoted a good deal of energy and effort to the instruction and indoctrination of officer personnel. From March 1969 he was at work in the Group of General Inspectors of the USSR Ministry of Defense.

Andrey Trofimovich never lost contact with his fellow servicemen. At one time he recommended me for study in an academy and was always interested in my further service and the concerns of other combat friends. And when I was in command of a division and when I was appointed commander of the Belorussian Military District I received from Andrey Trofimovich more than one letter with good advice which came in very handy. In a word, I owe him much in my life and military service.

By his labor and attitude toward his job, A. T. Stuchenko has earned the high regard of the army communists and the Soviet people. He was a delegate at the 21st, 22d and 23d CPSU Congresses. In 1961 and 1966 he was elected a candidate member of the CPSU Central Committee. At the 20th Congress of the Georgian Communist Party he was elected a member of the republic party Central Committee. A. T. Stuchenko was elected a member of the Bureau of the Central Committee of the Georgian Communist Party and a deputy to the USSR Supreme Soviet, 6th and 7th sittings. In all posts he has distinguished himself by great capacity for work and has won the respect of comrades. Andrey Trofimovich Stuchenko has received two Orders of Lenin, four Orders of the Red Banner, the Orders of Suvorov and Kutuzov 2d Degree, Patriotic War 1st Degree and many medals of the USSR as well as orders and medals of a number of foreign states.

On 18 November 1972, the heart of the loyal son of the Communist Party, the true war fighter and master of the peacetime training and indoctrination of the troops Andrey Trofimovich Stuchenko ceased to beat. But he will always remain in the memory of those who knew him and those who trod the fiery roads of the war with him.

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10272

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BIOGRAPHIC DATA ON MAR AVN S. I. RUDENKO GIVEN

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 86-88

[Article by Twice Hero of the Soviet Union, Winner of the Lenin Prize and Honored USSR Pilot, Mar Avn Ye. Savitskiy: "Mar Avn S. I Rudenko (On the Anniversary of His 80th Birthday)"]

[Text] Many generations of Soviet aviators are well familiar with the name of Mar Avn Sergey Ignat'yevich Rudenko. He ranks among the prominent Soviet military leaders raised by the Communist Party and who made a major contribution to the organizational development of the USSR Armed Forces and the defense of our socialist motherland.

Military service brought me together with Mar Avn S. I. Rudenko before the Great Patriotic War in the Far East. At that time, while still a colonel, S. I. Rudenko was in command of the 31st Mixed Air Division. My first meeting with him was in his office and left an indelible impression. Our conversation lasted 2½ hours. Even in such a brief time I realized that in front of me was an energetic and strong-willed person who had an excellent knowledge of his job and was responsive and considerate.

Sergey Ignat'yevich remains thus today. Clearly, precisely these qualities made it possible for him to follow a glorious combat path from student in an aviation school to marshal of aviation.

Sergey Ignat'yevich Rudenko was born on 7 (20) October 1904 in the settlement of Korop (now Chernigov Oblast).

Sergey Ignat'yevich began service in the distant year of 1923. At that time the 19-year-old Komsomol member Sergey Rudenko, the son of a cobbler, and who since childhood had known heavy labor had the good fortune of being admitted to the Kiev Flight School. Having become an officer candidate, he devoted all his energy and strength to mastering his beloved profession. Two years later, Rudenko had acquired the theoretical knowledge and was sent for further practical training to the Kacha School, the famous forge of flight personnel.

In 1927, the young aviator, having completed the First Military Pilots School, received appointment to the "Our Reply to Chamberlain" Air Brigade. During the same year he participated in an air parade devoted to the 10th Anniversary of

the Great October Socialist Revolution. In 1928, he became a member of the Communist Party. From 1932, after completing the Air Force Academy imeni N. Ye. Zhukovskiy, he was in command of a squadron which under his leadership achieved high results in military and political training. For this its commander received the Order of Lenin. A thirst for knowledge caused S. I. Rudenko again to enter the same academy but this time on the operations faculty. In 1936, having completed his instruction, he successively commanded an air squadron, an air brigade and an air division.

With the start of the war against the Nazi invaders, S. I. Rudenko was in command of an air division on the Western Front and he skillfully commanded its combat operations, showing high command skill, personal courage, exactingness for himself and subordinates as well as great will power. The pilots under the leadership of Sergey Ignat'yevich fought heroically, defending Moscow against air raids.

In October 1941, at the very peak of the battle for our capital, S. I. Rudenko was awarded the rank of major general of aviation. At the end of 1941, he was appointed the air force commander of the 61st Army. Subsequently, he was the deputy air force commander of the Kalinin and Volkhov Fronts, the air force commander of the Kalinin Front, the commander of the 1st Operational Air Group and the 7th Attack Air Group of Hq SHC. From June 1942, S. I. Rudenko was the deputy air force commander for the Southwestern Front.

The outstanding talent of the communist leader and the high commander qualities shown in previous battles made it possible for S. I. Rudenko to win proper respect. From October 1942 until the end of the war he headed the famous 16th Air Army.

The aviators from this army successfully defeated the enemy at Stalingrad, in the Kursk Battle, in the Belorussian, Warsaw-Poznan, East Pomeranian, Berlin and other offensive operations.

But these successes would have been impossible if Sergey Ignat'yevich Rudenko had relied solely on his abilities and knowledge. In preparing for and in the course of the operations he always sought the advice of his deputies and the commanders of the formations and units, he relied on the staffs, the political bodies and party organizations, he had a creative approach to resolving the difficult questions of the combat employment of aviation, he never resorted to mere routine, he was inclined to take decisions which were unexpected for the enemy and excelled in tenacity in achieving the set goals.

On the eve of the Vistula-Oder Operation, the III Fighter Air Corps which I happened to command at that time was included as part of the 16th Air Army. Thus, after a long interruption I again remet S. I. Redenko. From how he tersely and clearly brought me up on things and determined the missions for the goal I realized that here was an experienced aviation chief. Behind his every word you could feel great energy, will power and a clear mind.

I cannot help but recall the following fact. During the period of carrying out the Vistula-Oder Operation, upon the initiative of S. I. Rudenko, for the first

time during the Great Patriotic War, it was planned ahead of time for certain air formations to operate from airfields captured by our tank troops in the enemy rear as well as use individual sections of highways as airfields.

The 16th Air Army under the command of S. I. Rudenko had a glorious combat record. One out of every three of its air regiments became a guards unit, all the units were order-bearing and received the honorific designators of Volga and Stalingrad, Bakhmach and Nezhin, Chernigov and Gomel, Bobruysk and Brest, Warsaw and Lodzen, Brandenburg and Berlin (a total of 64 honorific designators). In the 16th Air Army there were 200 Heroes of the Soviet Union, three received this high title twice and one (I. N. Kozhedub) three times.

The motherland had high regard for the military accomplishments of S. I. Rudenko. He was awarded the title of Hero of the Soviet Union (19 August 1944), he was presented with five Orders of Lenin, the Order of the October Revolution, four Orders of the Red Banner, two Orders of Suvorov 1st Degree, the Orders of Kutuzov 1st Degree, Suvorov 2d Degree, "For Service to the Motherland in the USSR Armed Forces" 3d Degree, medals as well as foreign orders.

During the postwar period S. I. Rudenko was in command of the airborne troops, long-range aviation and was appointed the chief of the Air Force Main Staff, he was the first deputy commander-in-chief of the Air Forces and chief of the Air Force Academy imeni Yu. A. Gagarin. At present, he heads the Group of General Inspectors of the USSR Ministry of Defense.

S. I. Rudenko made a major contribution to the development of military history. He has been a member of the main editorial commissions of "Istoriya vtoroy mirovoy voyny 1939-1945" [History of World War II of 1939-1945] and "Istoriya Velikoy Otechestvennoy voyny Sovetskogo Soyuza 1941-1945" [History of the Great Patriotic War of the Soviet Union of 1941-1945] and was the leader of the author collective for the book "Sovetskiye Voenno-Vozdushnyye Sily v Velikoy Otechestvennoy voyne 1941-1945 gg." [The Soviet Air Forces in the Great Patriotic War of 1941-1945]. S. I. Rudenko is the author of a number of works devoted to Soviet aviation. In 1972, he was awarded the academic degree of professor.

S. I. Rudenko has been elected a deputy to the USSR Supreme Soviet 2d and 6th sittings and was a candidate member of the CPSU Central Committee (1961-1966).

For more than 60 years, S. I. Rudenko has been in the ranks of the USSR Armed Forces. Active social activities and a warm, considerate attitude toward others have won him the affection and respect of the military aviators and all the Soviet people.

During these days, we, the comrades in arms of Sergey Ignat'yevich, would like to warmly and sincerely congratulate him on this glorious jubilee and wish him good health, happiness and well being and great success in the activities aimed at strengthening the might of the USSR Armed Forces and at the good of our socialist motherland.

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10272

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BIOGRAPHIC DATA ON MAR AVN V. A. SUDETS GIVEN

Moscow VOYENNO-ISTORICHESKIY ZHURNAL in Russian No 10, Oct 84 (signed to press 26 Sep 84) pp 88-90

[Article by Col Gen Avn I. Podgornyy: "Mar Avn V. A. Sudets (On the Anniversary of His 80th Birthday)"]

[Text] Mar Avn Vladimir Aleksandrovich Sudets has remained in my memory as a person of exceptional energy, clarity of thought, and confidence in achieving the goal as well as an exacting commander. V. A. Sudets was born on 10 (23) October 1904 in the settlement of Nizhnedneprovsk (now a part of Dnepropetrovsk) in a family of a foundry worker. He began his labor activities at the age of 14. In 1920, after completing a 7-year school and later the Zaporozhye Mechanical-Technical School he worked as a milling machine operator and a tool-maker. From 1924, he was a member of the CPSU. In 1924-1925, he worked at the Zaporozhye Motor Building Plant where he was involved in Komsomol work. In September 1925, upon a recommendation of the Zaporozhye district committee of the Ukrainian RKP(b) [Russian Communist Party (Bolshevik)] and the Aviation Trust of the USSR VSNKh [Higher Council of the National Economy], he entered the Leningrad Military-Technical School of the Red Army Air Forces and upon completing this he served as an aviation technician. In 1929, in undergoing a course of instruction, he received the title of pilot of the RKKA [Worker-Peasant Red Army]. Having added to his flight and command experience at courses for the advanced training of command personnel under the First Military Pilot School in Kacha and the Air Force Academy imeni N. Ye. Zhukovskiy, he once and for all linked his life with the USSR Armed Forces and moved from officer candidate to marshal of aviation.

V. A. Sudets successively commanded a flight, detachment, an air brigade and an air division. He participated in the war against the White Finns.

Vladimir Aleksandrovich showed his abilities as a military leader most completely during the years of the Great Patriotic War. In commanding the IV DBA [Long-Range Bomber] Air Corps, he participated in the combat operations of the Soviet troops in the border engagements, in the defense of Kiev, Odessa and other

Ukrainian cities. From August 1941, V. A. Sudets was the air forces commander of the 51st Separate Army in the Crimea. From September 1942 through March 1943, Vladimir Aleksandrovich was in command of the I Bomber Air Corps which supported the ground troops on the Kalinin, Leningrad and Northwestern Fronts. In March 1943, V. A. Sudets was appointed commander of the 17th Air Army.

During the years of the Great Patriotic War, the personnel of the 17th Air Army in the fierce battles against the Nazi invaders showed self-sacrifice, valor, courage and an unshakable will for victory. Some 229 aviators of the 17th Air Army became Heroes of the Soviet Union¹ and thousands of its men were awarded combat decorations. The entire nation knows the names of the glorious aces from this air army such as the twice Heroes of the Soviet Union A. I. Koldunov, N. M. Skomorokhov, V. I. Popkov, V. A. Zaytsev, M. V. Kuznetsov and G. F. Sivkov.

The Supreme Commander-in-Chief commended 34 times the personnel of the 17th Air Army.²

In combat deeds the courage, valor, high military skill of the pilots, navigators, political workers, gunner-radio operators, engineers, technicians and engine specialists were combined with the initiative and maturity of the army leadership and their commander, Gen V. A. Sudets. Vladimir Aleksandrovich constantly sought new methods of combat in the tactics of air combat (air engagements) and strikes against enemy ground targets. He gave particularly great attention to organizing close cooperation of aviation with the ground troops. Only advance, impose one's will on the enemy and attack boldly and decisively. This has always led to victory, Gen V. A. Sudets constantly taught his air fighters.

In war, it is easy for no one, either a soldier or a commander. But while a private is responsible for himself, for carrying out a personal combat mission, the commander of an air army is responsible for the air support of an operation as a whole. There were many such operations, but the military art of the commander of the 17th Air Army was particularly apparent in the Iasi-Kishinev Operation. I happened to participate in it as the commander of a fighter air corps.

In accord with the plan of the commander of the Third Ukrainian Front, V. A. Sudets took the following decision: the basic forces of the air army were initially to assemble for supporting the 37th Army, the IV and VII Mechanized Corps fighting on the main sector while a portion of the forces was to support the 46th and 5th Attack Armies. In this operation, upon the initiative of V. A. Sudets, aviation for the first time carried out oblique photographing of the enemy defenses.

The pilots of the 17th Air Army under the leadership of V. A. Sudets were the first to help the Bulgarian people in liberating their country of the Nazi invaders. They provided a cover for Sofia against air strikes and they participated in apprehending trains with the German Military Mission which was hurrying to carry off the archives and plundered goods to Turkey.

The 17th Air Army played an important role in the battles for Belgrad, Budapest, Vienna and Prague.

After the end of the war, Col Gen Avn V. A. Sudets was appointed the chief of the Main Staff and deputy commander-in-chief of the Air Forces. From 1949 through 1950, he studied at the General Staff Military Academy after which he held a series of responsible positions in the Air Forces. From 1955, V. A. Sudets was the commander of the long-range aviation and deputy commander-in-chief of the Air Forces. During the same year, he was awarded the rank of marshal of aviation.

In 1962, Mar Avn V. A. Sudets was appointed the commander-in-chief of the National Air Defense Troops and USSR Deputy Minister of Defense. In this responsible position, Vladimir Aleksandrovich spent more than 4 years. From 1966, he was a military inspector-advisor of the Group of General Inspectors of the Ministry of Defense.

The Soviet government had high regard for the achievements of Mar Avn V. A. Sudets, having awarded him the title of Hero of the Soviet Union. He was also a People's Hero of Yugoslavia and a Hero of Mongolia. He was awarded four Orders of Lenin, the Order of the October Revolution, five Orders of the Red Banner, the Orders of Suvorov 1st and 2d Degree, the Order of Kutuzov 1st Degree, the Red Star, "For Service to the Motherland in the USSR Armed Forces" 3d Degree as well as numerous medals.

V. A. Sudets was a delegate to the 20th, 22d and 23d CPSU Congresses, a delegate of the 21st and 22d Congresses and a member of the Central Committee of the Belorussian Communist Party. At the 22d CPSU Congress, he was elected a candidate member of the CPSU Central Committee and was a deputy to the USSR Supreme Soviet, 6th sitting.

For a number of years V. A. Sudets was a member of the editorial board of VOYENNO-ISTORICHESKIY ZHURNAL, he carried out extensive military-patriotic work, he maintained close ties with the Lenin Komsomol and participated in indoctrinating our youth in the revolutionary, military and labor traditions.

Vladimir Aleksandrovich died on 6 May 1981.

The life of Mar Avn V. A. Sudets is a vivid example of unstinting service of the people, the party, the socialist motherland and its glorious Armed Forces.

FOOTNOTES

¹ "Sovetskaya Voyennaya Entsiklopediya" [Soviet Military Encyclopedia], Moscow, Voenizdat, Vol 2, 1976, p 298.

² Ibid., Vol 7, 1979, p 593.

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